



**ANNUAL
REPORT
1913**

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COMPLIMENTS OF

F. J. H. KRACKE

COMMISSIONER OF BRIDGES



NEW YORK CITY. NEW MUNICIPAL BUILDING. 1913.

Figure on tower—CIVIC FAME, female figure crowned with wreath of laurel, holding aloft a mural crown with five parapets, symbolical of the five Boroughs and encircled at its base by a band of dolphins, symbolizing the seaport city. Suspended from her right arm is a shield bearing a coat of arms of the City surmounted by a branch of laurel held aloft in her right hand.

CITY OF NEW YORK

Department of Bridges



ANNUAL REPORT

FOR THE

Year Ending
December 31st, 1913

COMMISSIONER OF BRIDGES, - - Hon. F. J. H. KRACKE
DEPUTY COMMISSIONER, - Hon. LAWRENCE B. DUNHAM



New York City,
May 1, 1914.

His Honor, the Mayor,
City Hall, New York:

SIR—I hand you, herewith, report on the work of the Department of Bridges for the year ending December 31, 1913.

A number of illustrations and photographs are introduced in order to place on record, for future use, information which is valuable and cannot be as well presented in any other way.

Respectfully,

F. J. H. KRACKE,
Commissioner, Department of Bridges.

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BRIDGES UNDER THE JURISDICTION OF THE DEPARTMENT OF BRIDGES

Dec 31, 1913

NO.	NAME	WATERCROSSING	TERMINALS	TYPE OF BRIDGE	CLEARANCE ABOVE HIGH WATER	GREATEST SPAN	LENGTH OF BRIDGE	LENGTH OF APPROACHES	TOTAL WIDTH OF BRIDGE
1	BROOKLYN	East River	Brooklyn Bridge	Suspension	133	1595.5	3455.5	2560.9	86
2	MANHATTAN	East River	Manhattan Bridge	Suspension	135	470	2920	393.5	122.5
3	WILLIAMSBURG	Brooklyn River	Williamsburg Bridge	Suspension	135	800	2793	451.5	118
4	QUEENSBORO	Hudson River	Queensboro Bridge	Can'tilever	135	1182	3724.5	3724.5	89.5
5	WILLIS AVE.	Hudson River	Willis Ave. Bridge	Swing	24	304	2507	2196.8	70
6	THIRD AVE.	Hudson River	Third Ave. Bridge	Swing	24	300	2251.5	1949	86
7	MADISON AVE.	Hudson River	Madison Ave. Bridge	Swing	24	300	1880	1583	82.2
8	145TH STREET	Hudson River	145th St. Bridge	Swing	24	300	1603	1293	84
9	MACOMBS DAM	Hudson River	Macombs Dam	Swing	24	400	2540	2126.4	67.7
10	N.Y. & PUTNAM	Hudson River	N.Y. & Putnam Bridge	Swing	24	954	954	654	6
11	WASHINGTON	Hudson River	Washington Bridge	Swing	135.5	510	2399	1889	86
12	UNIVERSITY HEIGHTS	Hudson River	University Heights Bridge	Swing	24	270	1084.5	820	51.2
13	SHIP CANAL	Hudson River	Ship Canal Bridge	Swing	24	270	346	276	34.2
14	FARMERS	Spuyten Duyvil Creek	Farmers Bridge	Fixed	24	53.8	53.8	43.2	21.1
15	BROADWAY	Spuyten Duyvil Creek	Broadway Bridge	Fixed	123	40	46.5	—	100
16	KINGSBRIDGE	Spuyten Duyvil Creek	Kingsbridge Ave. Bridge	Fixed	3.5	68	68	39	19
17	135TH STREET	Mott Haven Canal	135th St. Bridge	Bascule	65	37	561	—	73.5
18	WESTCHESTER AVE.	Bronx River	Westchester Ave. Bridge	Retractable	17	105	114	—	60
19	UNIONPORT	Westchester Creek	Unionport Bridge	Swing	75	137	188	51	22
20	PELHAM	Eastchester Bay	Pelham Bridge	Bascule	19	105	797	700	52
21	CITY ISLAND	Pelham Bay Narrows	City Island Bridge	Swing	126	168	768	1600	50
22	EASTCHESTER	Hutchinson River	Eastchester Bridge	Swing	88	105	403	338	18.3
23	HAMILTON AVE.	Gowanus Canal	Hamilton Ave. Bridge	Bascule	18	72.4	81.5	—	47.3
24	NINTH ST.	Gowanus Canal	Ninth St. Bridge	Bascule	8	56	100	276	49
25	THIRD ST.	Gowanus Canal	Third St. Bridge	Bascule	10	56	100	276	49
26	CARROL ST.	Gowanus Canal	Carrol St. Bridge	Retractable	3.5	107	140	99	28
27	UNION ST.	Gowanus Canal	Union St. Bridge	Bascule	9	56	100	276	49
28	WASHINGTON AVE.	Whitewater Canal	Washington Ave. Bridge	Retractable	573	123	115.5	65.5	45
29	METROPOLITAN AVE.	English Kills	Metropolitan Ave. Bridge	Swing	7	174	365	95	33
30	HARWAY AVE.	Coney Island Creek	Harway Ave. Bridge	Bascule	6	55	300	247	33.2
31	THIRD AVE.	5th St. Basin	Third Ave. Bridge	Fixed	13	39	42	—	70.3
32	OCEAN AVE.	Sheepshead Bay	Ocean Ave. Bridge	—	2	—	2318	—	8
33	SHELL ROAD	Coney Island Creek	Shell Road Bridge	—	24	—	161.75	—	16.8
34	LEMON CREEK	Lemon Creek	Lemon Creek Bridge	Retractable	4	34	100	30	12
35	FRESH KILLS	Richmond Creek	Fresh Kills Bridge	Swing	5	95	1926	1836	20
36	VERNON AVE.	Newtown Creek	Vernon Ave. Bridge	Bascule	24	172	1898.6	1500	60
37	GREENPOINT AVE.	Greenpoint Ave.	Greenpoint Ave. Bridge	Swing	15	206.7	282	75	32
38	MEEKER AVE.	Meeker Ave.	Meeker Ave. Bridge	—	6	200	784	84	31
39	GRAND ST.	Grand St.	Grand St. Bridge	—	10	223.6	550	320	36
40	METROPOLITAN AVE.	Metropolitan Ave.	Metropolitan Ave. Bridge	Fixed	4	105	105	60	32
41	BORDEN AVE.	Borden Ave.	Borden Ave. Bridge	Retractable	3.5	169	265	90	30.5
42	FLUSHING	Flushing Creek	Flushing Bridge	Bascule	12	68	351	262	32
43	STRONGS CAUSEWAY	Flushing Creek	Strong's Causeway	Swing	2	125	139.2	44	33.2
44	LITTLE NECK	Alley Creek	Alley Creek Bridge	—	2	20	187.2	65	18
45	HUNTERS POINT AVE.	Hunter's Point Ave.	Hunter's Point Ave. Bridge	Bascule	9.5	71.5	133	64	46

* Discontinued - August 1911
† Discontinued - July 25, 1913



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
Map Showing
LOCATION OF BRIDGES

December 31, 1913

During the year 1913, the Department of Bridges, following the general policy heretofore adopted, continued to maintain and operate the several structures under its jurisdiction, consisting of the forty-three bridges within the City limits which span navigable waters or which have a terminus in two or more Boroughs.

In addition to the regular work of the Department, the State Legislature imposed on the Commissioner of the Department of Bridges, the responsibility for and control over the construction of the new Municipal Building, which is to house the administrative departments of the City Government. The work of constructing the building progressed steadily during the year.

The idea of making the public places of the City pleasing to the eye of the observer was advanced; the approaches, fender piers and bridge plazas under the control of the Department being so treated as to combine artistic effect with actual utility.

The past state of efficiency among the twelve hundred employees of the Department was maintained.

The construction work under way at the beginning of the year and that undertaken during the course thereof, progressed satisfactorily and is described in detail in this report under the subheadings for the various bridges.

The improved system of cost accounting, heretofore recommended by the Department of Finance, was brought fully up to date during the year.

A General Stores Ledger was installed, thus giving the Administrative Branch of the Department entire control over the stores and showing the details concerning the purchase, use and consumption of over five thousand articles or units of supplies, equipment and materials.

By the effecting of economies in maintenance, the cost of the Department to the City was considerably reduced over that of the previous year.

DESCRIPTION
OF
BRIDGE DEPARTMENT
CITY OF NEW YORK

AS PREPARED FOR THE INTERNATIONAL
EXPOSITION, CITY OF LYONS, FRANCE
TO BE HELD IN 1914

EAST RIVER BRIDGES—NEW YORK CITY

The four great bridges spanning the East River and connecting three of the five boroughs of the City of New York are exceeded in general dimensions only by one existing bridge, as shown in the following table of the world's seven largest bridges:

Name of Bridge, Location, Type.	Greatest Span.	Total Length.
Firth of Forth, Scotland, cantilever.....	1,710 feet	8,100 feet
Williamsburg, United States, suspension.....	1,600 feet	7,308 feet
Brooklyn, United States, suspension.....	1,595.5 feet	6,016 feet
Manhattan, United States, suspension.....	1,470 feet	6,855 feet
Queensboro, United States, cantilever.....	1,182 and 984 feet	7,448.5 feet
Buda Pesth, Hungary, suspension.....	951 feet	1,407 feet
Niagara Arch, United States-Canada, steel arch.....	840 feet	1,240 feet

History.	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.	Queensboro Bridge.
Construction of masonry piers started	Jan. 3, 1870	Oct. 1, 1901	Nov. 7, 1896	July 19, 1901
Construction of steel work started	May 29, 1877	Apr. 30, 1906	Feb. 21, 1899	Nov. 20, 1903
Bridges opened to public...	May 24, 1883	Dec. 31, 1909	Dec. 19, 1903	Mar. 30, 1909
Surface cars first operated	Jan. 23, 1898	Sept. 4, 1912	Nov. 3, 1904	Oct. 4, 1909
Elevated cars first operated	Sept. 24, 1883	.....	Sept. 16, 1906	.....

Costs.	Brooklyn Bridge.	Manhattan Bridge.	Wil- liamsburg Bridge.	Queensboro Bridge.	Totals.
For construction	\$16,091,580	\$14,104,900	\$14,181,559	\$13,496,500	\$57,874,539
For land	8,880,837	10,000,300	9,096,000	4,377,753	32,354,890
Totals	\$24,972,417	\$24,105,200	\$23,277,559	\$17,874,253	\$90,229,429

Three of these bridges, the Brooklyn, Manhattan and Williamsburg Bridges, although of the same general type, having large cables, carried over towers and anchored at each shore end in masonry, and auxiliary or "stiffening" trusses suspended from these cables and distributing the moving loads uniformly to them, differ in the following essential details:

1. The Brooklyn Bridge has six very light stiffening trusses, the two outer ones only $9\frac{1}{2}$ feet high, the other four 17 feet high, with a distance between points of suspension of only $7\frac{1}{2}$ feet. As a consequence the bridge is very flexible and under two six-car trains will deflect at the centre about two feet. A feature peculiar to this bridge is the stay system, a series of wire cables spreading out fan-like from the top of each tower and connecting in succession to the bottom of each alternate suspender. The towers, on this bridge only, are masonry for their entire height.

2. The Manhattan Bridge has four stiffening trusses, each 24 feet high and with 20 feet between points of suspension.

3. The Williamsburg Bridge has only two stiffening trusses, each 40 feet high, and with 20 feet between points of suspension. The cables are "cradled" in pairs, that is, brought together by each successive set of suspenders, from a distance apart of 22 feet at the towers to 4 feet at the centre of the river span. The end or "shore" spans on this bridge, unlike the other bridges, are not suspended from the cables but are supported independently at the main and intermediate towers and the anchorages.

These three bridges connect the boroughs of Manhattan and Brooklyn, with population totals in 1910 of 2,331,542 and 1,634,351, respectively.

4. The Queensboro Bridge, furthest to the north, is of the cantilever type, having three land spans, one of which is over Blackwells Island, and two cantilever or "river" spans. This bridge differs from the usual cantilever bridge in that it has no suspended span connecting the cantilever arms of the river spans. The suspended span might be considered as of zero length and its place as taken by a rocker arm. There are two trusses, 60 feet apart, varying in height from 45 feet to 185 feet and with panel lengths from 43 feet to 80 feet. The Queensboro Bridge connects the Borough of Manhattan with the Borough of Queens, which had a population total in 1910 of 284,141.

The Brooklyn Bridge has 4 main cables and 6 stiffening trusses, outer ones	82.2 feet apart
The Manhattan Bridge has 4 main cables and 4 stiffening trusses, outer ones	96 feet apart
The Williamsburg Bridge has 4 main cables and 2 stiffening trusses, outer ones	67 feet apart
The Queensboro Bridge has 2 main trusses.....	60 feet apart

Each cable of the first three bridges has a diameter in the order named of 15.75, 21.25 and 18.6 inches. These cables altogether have an ultimate or breaking strength of 496,000,000 pounds, or sufficient to hold suspended a weight equivalent to 1,653 of the average type of freight locomotives weighing 150 tons each.

The two main trusses of the Queensboro Bridge vary in section, being heaviest at the towers, where the two bottom chords alone have a combined area of 2,220 square inches, and a total ultimate strength of 133,200,000 pounds.

LENGTH OF CABLES AND WIRES.

	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.
Length, each cable—C. to C. anchor pins..	3,578.5 feet	3,224 feet	2,985 feet
Number of wires in each cable.....	5,296	9,472	7,696
Total number of wires.....	21,184	37,888	30,784
Total length of wires.....	14,357 miles	23,858 miles	17,403 miles

Or a total combined length of 55,618 miles. This is equivalent to about two and one-fourth times the earth's circumference.

WEIGHTS OF STEEL AND IRON

	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.	Queensboro Bridge.
In cables and suspenders....	3,600 tons	7,950 tons	4,900 tons	.....
In other parts main bridges.	8,400 tons	33,780 tons	23,800 tons	54,200 tons
In approaches	10,200 tons	15,770 tons	16,600 tons	19,600 tons
Totals	22,200 tons	57,500 tons	45,300 tons	73,800 tons

—or a total weight of 198,800 tons for the four bridges. If all this steel were made into a rod one inch in diameter, the rod would have a length of 28,200 miles. The average heavy locomotive weighs 150 tons. The above total weight would be equivalent to 1,325 locomotives. The average heavy freight car holds 40 tons. To transport the steel and iron in these bridges, if reduced to sections easily loaded, would require 4,970 cars.

TRUSSES, ETC., QUEENSBORO BRIDGE

MAXIMUM SECTIONS.

Material.	Tower Post, Carbon Steel.	Diagonal, Carbon Steel.	Bottom Chord, Carbon Steel.	Top Chord, Nickel Steel.
Length	19½'	105'	59'	48'
Outside dimensions	5'x11'	3½'x4½'	4'x6'	20 bars, 16"x2½"
Square inches cross section..	1,396	287	1,110	.....
Weight per foot, pounds.....	16,460	1,710	4,100	2,400
Total weight, pounds.....	126,000	180,000	240,000	40,300
Ultimate strength, tons.....	41,880	8,610	33,300	34,000

Height of pedestal under each of the two tower legs at the four main piers, 10 feet 3 inches, composed of three courses of steel castings, total weight 140 tons.

Heaviest nickel steel pin, 16 inches diameter and 10 feet long, weighing about 7,000 pounds. Pins were driven with a two-ton ram.

Rivets in bottom chord were one inch in diameter with a seven-inch grip.

TOTAL MASONRY

Cubic yards of masonry in main piers, Brooklyn Bridge, 85,160; in anchorages	56,620
Cubic yards of masonry in main piers, Manhattan Bridge, 79,600; in anchorages	228,500
Cubic yards of masonry in main piers, Williamsburg Bridge, 45,500; in anchorages	112,800
Cubic yards of masonry in main piers and anchorages, Queensboro Bridge	53,000

—or a total for the four bridges of 661,180 cubic yards, equal in weight to 1,428,100 tons, which would just about be equal to the total tonnage of 55 first-class battleships of 26,000 tons each.

CARRYING CAPACITY—MAIN BRIDGES

	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.	Queensboro Bridge.
Fixed load, per lineal foot..	8,000 lbs.	23,600 lbs.	16,620 lbs.	32,200 lbs.
Moving load, per lineal foot	3,400 lbs.	16,000 lbs.	main side 7,500 lbs. 16,000 lbs.	16,000 lbs.
Fixed load for entire structure	13,820 tons	34,460 tons	23,210 tons	60,000 tons
Moving load for entire structure	5,880 tons	23,360 tons	15,560 tons	29,800 tons
Total load for entire structure	19,700 tons	57,820 tons	38,770 tons	89,800 tons

—or a total carrying capacity over the entire length of the four main bridges from anchorage to anchorage of 206,090 tons.

LENGTHS (in feet)

	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.	Queensboro Bridge.
Main spans	1,595.5	1,470	1,660	1,182 and 984
Side spans	1,860	1,450	1,193	1,558.5
Total, main bridge	3,455.5	2,920	2,793	3,724.5
Approaches	2,560.5	3,935	4,515	3,724.0
Totals	6,016.0	6,855	7,308	7,448.5

The above does not include the plazas or the terminal buildings connected with these bridges.

ROADWAYS

Brooklyn Bridge has two roadways 16' 9" wide, total area.... 23,500 square yards
 Manhattan Bridge has one roadway 35' 0" wide, total area.... 26,900 square yards
 Williamsburg Bridge has two roadways 19' 11" wide, total area. 32,300 square yards
 Queensboro Bridge has one roadway 53' 3" wide, total area..... 45,800 square yards
 —or a total area of 128,500 square yards. A roadway 30 feet in width of this area would have a length of seven miles.

VEHICULAR TRAFFIC

The estimate of the total number of vehicles crossing on the roadways of the four East River Bridges during 1913 was as follows:

Brooklyn Bridge	1,403,100 vehicles
Manhattan Bridge	2,015,300 vehicles
Williamsburg Bridge	2,472,300 vehicles
Queensboro Bridge	2,191,300 vehicles
Total	8,082,000 vehicles

If these vehicles could be placed in ranks four abreast, each occupying an average space of 30 feet in length, they would form a line 11,500 miles long, equivalent to about seven times the distance from Paris to St. Petersburg.

FOOTWALKS

Brooklyn Bridge has one footwalk 15' 7" wide, total area..... 9,962 square yards
 Manhattan Bridge has two footwalks 13' 7" wide, total area.... 17,456 square yards
 Williamsburg Bridge has two footwalks 17' 8" wide, total area 26,030 square yards
 Queensboro Bridge has two footwalks 16' 4" wide, total area.... 30,710 square yards

On the Manhattan and Williamsburg Bridges, only one footwalk on each bridge is open at present. The estimate for the past year of the total number of persons crossing on these footwalks was as follows:

Brooklyn Bridge	3,067,000 persons
Manhattan Bridge	915,000 persons
Williamsburg Bridge	1,339,000 persons
Queensboro Bridge	420,800 persons

Or a total of 5,741,800 persons for the four bridges.

The length of these walks, from one to one and one-half miles, prevents a greater use of these by a traveling public. However, if the persons crossing these bridges in one year were to be assembled in companies of twenty and these companies placed three feet apart, the line formed would be 163 miles long, and at a fair

marching rate of $3\frac{1}{2}$ miles per hour, 47 hours would be required for the whole assemblage to pass a given point.

RAILWAY LINES

	Brooklyn Bridge.	Manhattan Bridge.	Williamsburg Bridge.	Queensboro Bridge.
Surface car tracks provided.....	2	4	4	4
Surface car tracks now in use...	2	2	4	4
Surface car lines operated.....	17	2	18	9
Elevated (or subway) tracks provided	2	4	2	4
Elevated (or subway) tracks now in use	2	..	2	..
Elevated lines operated.....	8	..	3	..
Surface car round trips, 1913....	1,474,610	46,231	1,638,018	507,030
Elevated Ry. car round trips, 1913.	1,409,033	.....	358,247	.....

—or a grand total of 3,665,889 surface car round trips and 1,767,280 elevated railway car round trips were made over the East River bridges in 1913.

The average length of these surface cars is *forty-two* feet, of the elevated railway cars *fifty-one and one-half* feet. Hence, if these cars were, for illustration, to be used on tracks 900 miles long, the distance from Paris to Madrid, 52 parallel tracks would be filled from end to end with these cars, and if each one of these 52 trains, each 900 miles long, were to proceed westward simultaneously at the usual rate of speed of city car lines, 15 miles per hour, $2\frac{1}{2}$ days would elapse before the rear car on each one of the 52 trains had reached Madrid.

The estimate for passengers on the various surface car lines crossing the East River bridges during 1913 was 120,216,100, and similarly for the elevated railway lines was 105,754,900. The grand total of people crossing these bridges, including the pedestrians and people in vehicles and cars for 1913 was 242,708,400.

The population of Paris in 1911 was 2,888,110; or about one eighty-fourth of this total.

TRAFFIC FOR 24 HOURS

A count by half hours was made on October 30, 1913, of all the traffic crossing the East River bridges during a complete cycle of twenty-four hours. As in previous years, this count was made in the fall of the year, when the routine business traffic has resumed its normal state.

A brief summary of the total traffic for twenty-four hours is as follows:

Total Traffic Both Directions.	Brooklyn Bridge.	Manhattan Bridge.	Williams- burg Bridge.	Queensboro Bridge.	Total.
Elevated railroad cars.....	7,352	.....	2,776	.....	10,128
Surface railway cars.....	7,725	1,600	9,074	2,965	21,364
Vehicles	4,214	6,046	7,417	6,574	24,251
Elevated railroad passengers..	184,886	.....	129,911	.....	314,797
Surface railway passengers...	106,489	31,188	165,570	61,938	365,185
Vehicular passengers	7,304	10,852	14,661	14,741	47,558
Pedestrians	8,166	1,780	3,205	2,301	15,452
Total people crossing October 30, 1913	306,845	43,820	313,347	78,980	742,992
Total people crossing October 24, 1912	344,268	14,610	240,889	59,824	659,591
Increase, 1913 .....	.....	29,210	72,458	19,156	83,401
Reduction, 1913	37,423	.....	.....	.....	.....

TOTAL WEIGHTS

Trains, cars, vehicles and passengers passing over the four bridges in twenty-four hours:

Promenade passengers	2,610,000	pounds
Elevated trains and passengers	593,536,000	pounds
Surface cars and passengers.....	775,320,000	pounds
Automobiles	10,500,000	pounds
Trucks	60,000,000	pounds
Total	1,441,966,000	pounds

—or equal in weight to twenty-eight 25,000-ton battleships of the dreadnought class.

For the first time in the history of these bridges the Brooklyn Bridge failed to show a larger amount of traffic than any of the other East River bridges. This was due in part to the opening of the Centre Street Loop and the operation, beginning August 4, 1913, of trains across the Williamsburg Bridge and through the Subway Loop to Chambers street, one block north of the entrance to the Brooklyn Bridge. A large number of people from two of the most thickly populated districts in Brooklyn, the Ridgewood and East New York sections, instead of going to New York via the Brooklyn Bridge are now taking the shorter, more direct, route across the Williamsburg Bridge.

The following table shows the percentage of total passenger traffic for 24 hours across the East River bridges for the past four years, on the days on which the traffic count was made:

	1910.	1911.	1912.	1913.
Brooklyn Bridge	53.7	54.3	52.2	41.3
Manhattan Bridge	1.3	1.5	2.2	5.9
Williamsburg Bridge	38.0	36.7	36.5	42.2
Queensboro Bridge	7.0	7.5	9.1	10.6

Length of line of traffic passing over the four East River Bridges in twenty-four hours:

Passengers	453 miles
Surface cars	147 miles
Elevated trains	88 miles
Automobiles	9 miles
Trucks	55 miles

Total 752 miles

The traveling distance from Paris to Berlin is 674 miles.

TRAFFIC DURING RUSH HOURS

One-half of all the traffic for twenty-four hours crosses the East River bridges in four hours, *i. e.*, the "rush" hours—7 to 9 a. m. and 5 to 7 p. m., or an average for each of the four hours of 90,000 persons per hour.

The greatest concentration of traffic occurs between the hours of 5.30 and 6.30 in the afternoon. During this one hour the passenger traffic over the four bridges, as counted on October 30, 1913, amounted to 113,108 persons. This is at the rate of about 1,900 persons per minute.

The steamship "Olympic" has a total capacity of passengers and crew of 3,360.

A ferry of this capacity would have to make 34 trips to transport the people who cross the East River bridges in one hour.

The United States Army, with a total of 87,190 enlisted men and 4,845 officers, would be transported over these bridges in about forty-nine minutes under the same conditions as obtain during the usual maximum rush hour traffic.

TRANSPORTATION FACILITIES

If all the transportation facilities of the East River bridges were put into use and every lane of travel crowded up to the maximum allowed for safe operation and the structural limitations of the bridges, the following number of passengers could be carried over these bridges in one hour:

Brooklyn Bridge	116,500
Manhattan Bridge	228,400
Williamsburg Bridge	183,600
Queensboro Bridge	177,000
Total	705,500

In other words, there could be transported in about $10\frac{1}{4}$ hours the 7,252,963 residents of London; or in about 4 hours the 2,888,110 residents of Paris; or in less than 3 hours the 2,070,695 residents of Berlin.

DIVISION
OF
EAST RIVER BRIDGES
1913

DIVISION OF EAST RIVER BRIDGES, 1913

The Division of East River Bridges has under its jurisdiction the four bridges spanning the East River, three of which—the Brooklyn, Manhattan and Williamsburg Bridges—are of the suspension type; the fourth, the Queensboro Bridge, a special cantilever type with two river spans, each of which has a rocker arm connection in place of a suspended span. The length of the four main structures is 12,893 feet, and of the approaches 14,736 feet, making a total of 27,629 feet. There are 136,500 tons of steel in the main bridges, and 661,200 cubic yards of masonry in the main piers and anchorages. The total steel in the approaches, as now constructed, amounts to 62,155 tons.

The East River Bridges represent an aggregate outlay for construction purposes of \$57,904,540, and a total outlay of \$90,229,430, which includes the cost of land for approaches and terminals. Construction work now going on and not included in the above cost consists of the Subway Connection at the Manhattan end of the Brooklyn Bridge; the Brooklyn and the Manhattan Plazas of the Manhattan Bridge; and the reinforcement of the Main and End Spans of the Williamsburg Bridge.

The thorough and systematic inspection of these structures; the prompt inauguration of all repairs found necessary; the continuation of repairs and replacements in progress; the painting and cleaning of the main structures, approaches, terminals and small buildings; the care and custody of all City property; and the maintenance of traffic on all the roadways, promenades and car tracks, have all been kept up during the year. The bridges have also been maintained through the period without any serious mishaps to the structures or accidents to the traveling public.

The total amount of travel for the years 1912 and 1913, as estimated from the total car trip returns and from counts made on typical days, is shown in the following tables:

TOTAL TRAFFIC OVER EAST RIVER BRIDGES DURING 1912.

	Brooklyn Bridge.	Manhattan Bridge.	Williams- burg Bridge.	Queens- boro Bridge.	Totals.
Surface cars, round trips....	1,474,610	46,231	1,638,018	507,030	3,665,889
Elev. R. R. cars, round trips.	1,049,035	.....	358,247	.....	1,767,282
Vehicles, etc., on roadways..	1,282,000	1,607,800	1,974,700	1,214,700	6,079,200
People crossing—					
On footwalks	3,067,000	915,000	1,339,000	420,800	5,741,800
On roadways	1,992,000	2,771,300	3,626,000	2,606,300	10,995,600
In surface cars	44,120,600	1,816,900	55,870,200	18,408,400	120,216,100
In elevated cars	79,379,900	.....	26,375,000	.....	105,754,900
Total people crossing bridges	128,559,500	5,503,200	87,210,200	21,435,500	242,708,400

TOTAL TRAFFIC OVER EAST RIVER BRIDGES DURING 1913.

	Brooklyn Bridge.	Manhattan Bridge.	Williams- burg Bridge.	Queens- boro Bridge.	Totals.
Surface cars, round trips....	1,379,628	262,136	1,618,275	533,360	3,793,399
Elev. R. R. cars, round trips.	1,387,522	.....	410,678	.....	1,798,200
Vehicles, etc., on roadways..	1,403,100	2,015,300	2,472,300	2,191,300	8,082,000
People crossing—					
On footwalks	2,980,000	650,000	1,169,800	839,600	5,639,400
On roadways	2,768,000	3,617,300	4,887,000	4,913,700	16,186,000
In surface cars	37,910,100	10,290,000	59,108,500	22,297,700	129,606,300
In elevated cars	69,702,000	.....	38,453,800	.....	108,155,800
Total people crossing bridges	113,360,100	14,557,300	103,619,100	28,051,000	259,587,500
Increase over 1912 .....	.....	9,054,100	16,408,900	6,615,500	16,879,100
Reduction from 1912	15,199,400	.....	.....	.....	.....

A count, by half hours, of all the traffic crossing the bridges in a complete cycle of 24 hours is made annually, and special counts are made as occasion demands of such parts of the traffic as may be required to procure the information necessary for traffic changes or proposed additional construction. The annual count is made in the fall of the year, when the regular daily business traffic has assumed its normal stage. This count is made by employees of the division, detailed for the purpose from the regular engineering, mechanical and labor forces, and with the co-operation of the various companies operating cars over the East River Bridges.

The annual count of traffic by half hours for the current year was made on Wednesday and Thursday, October 29th and 30th. Copies of the general plan for taking the count on each bridge and schedules of all posts had been previously forwarded to all companies operating cars over the bridges, bulletins were posted by these companies, giving full information to the employees, and on the days of the count the car conductors filled out cards for inbound cars and called out to Department employees the register readings on the outbound cars. Passameter readings, train and car schedules were also furnished, where required, by these companies. The Department employees assigned to the various posts for collecting conductors' cards, recording car lines and passengers, pedestrians and vehicles, were divided into eight-hour shifts and reported for the same shift each day. No delays to traffic occurred on any of the bridges during the count, except for two blockades of short duration on the New York Railway's lines on the Williamsburg Bridge.

The work of tabulating the annual count of traffic was completed on December 23, and prints of the tracings and tables were sent out to all operating companies and various civic organizations. An increase in total traffic, as compared with the previous year's count, was shown on the Manhattan, Williamsburg, and Queensboro Bridges, amounting to 200, 30, and 32 per cent., respectively, the Brooklyn Bridge only showing a loss, namely, 11 per cent. The Williamsburg Bridge this year, for the first time, carries more traffic than any other bridge, the percentages of the total traffic over the East River Bridges being as follows:

	October 24, 1912.	October 30, 1913.
Brooklyn Bridge	52.2 per cent.	41.3 per cent.
Manhattan Bridge	2.2 per cent.	5.9 per cent.
Williamsburg Bridge	36.5 per cent.	42.2 per cent.
Queensboro Bridge	9.1 per cent.	10.6 per cent.

The above changes were in part due to the following transit facilities, added during the year:

November 14, 1912—Brooklyn & North River Railroad Company started operation of cars over the Manhattan Bridge.

January 29, 1913—Manhattan and Queens Traction Corporation extended Queensboro Bridge car service by operating cars over Thompson avenue viaduct.

August 4, 1913—New York Municipal Railway Corporation began operating trains over Williamsburg Bridge through Centre street subway to Chambers street.

The accompanying tables give in detail the results of this count, as follows:

ER 25 B—Traffic Summary for 24 hours, Brooklyn Bridge.

ER 26 B—Traffic Summary for 24 hours, Williamsburg Bridge.

ER 27 B—Traffic Summary for 24 hours, Manhattan Bridge.

ER 28 B—Traffic Summary for 24 hours, Queensboro Bridge.

ER 29 B—Traffic Comparison, 24 hours, 1912 and 1913, all bridges.

ER 30 B—Traffic Comparison, rush hours, 1912 and 1913, all bridges.

ER 31 B—East Bound Elevated Railroad Traffic.

The rules for the regulation of vehicular traffic on each bridge of the division have been codified and made ready for printing. It is proposed to have these distributed among the trucking concerns, manufacturers, etc., using the bridges, so that the load limits, clearances, etc., of each bridge may be fully known and any special loads or vehicles may be diverted to the right bridge, thus averting the delays consequent from turning back a vehicle after it has once entered on a bridge roadway.

A standard form of snow removal report, giving the general data and full details as to time employed and costs of department labor, emergency labor, cartage, etc., was prepared and adopted for use in this division, where, until the present year, the cost of removing the snow from the numerous storms occurring during the winter months has been an item of considerable expense. Only one storm, however, occurred during the year, namely, on February 3d and 4th, having a total fall of 2.0 inches. The snow was cleared from the bridges at a total cost as follows: Areas cleared, in square yards, Bridge Roadways, 128,590; Bridge Promenades, 60,220; Street Areas, 102,790; total areas cleared, 291,600 square yards; total costs for Department labor, regular time, \$512.40; emergency and overtime labor, \$80; cartage, \$222.10; total, \$814.50; the cost, therefore, per 1,000 square yards cleared per inch of depth of snow being \$1.40.

The following table shows the cost for the maintenance of each of the East River bridges for the years 1912 and 1913. The final costs are given in detail elsewhere:

	1912.	1913.
Brooklyn Bridge	\$338,607 42	\$334,727 94
Manhattan Bridge	62,767 00	62,632 74
Williamsburg Bridge	271,328 07	238,685 08
Queensboro Bridge	90,513 00	89,433 98

In regard to the greater cost of maintenance of the two older bridges, it may be stated that the Brooklyn Bridge has been open to traffic for over thirty years, the Williamsburg Bridge for over ten years, and that these two bridges together carry over 83 per cent. of the traffic over the East River bridges. The Brooklyn Bridge was constructed at a time when electrically propelled trains and cars were not thought of, and the present heavy traffic was not provided for in the construction of the bridge. Constant watchfulness of all parts and the prompt institution of repairs where necessary are all that keep this great traffic going without interruption, and alone account for the extra expense required.

BROOKLYN BRIDGE—TRAFFIC COUNT—OCTOBER 30, 1913.

Total Traffic for 24 Hours (ER—25B).

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Elevated Trains	920	....	980	....
Elevated Cars	—	3,676	—	3,676
Surface Cars—				
Brooklyn Rapid Transit.....	2,858	38,344	2,852	41,599
Coney Island & Brooklyn.....	670	6,459	679	7,303
Bridge Local	333	6,784	333	6,000
	—	3,861	—	3,864
Trucks—				
One-Horse	959	1,388	807	1,339
Two-Horse	491	773	468	533
Three (or more) Horse.....	14	15	13	15
Motor	202	357	188	386
	—	1,666	—	1,476
		2,533		2,273

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Carriages, Etc.—				
One-Horse	34	60	24	41
Two-Horse	19	57	31	101
Passenger Autos	434	968	481	1,224
Led Horses	6	4	5	5
Miscellaneous	21	21	17	17
	514	1,110	558	1,388
Pedestrians .....	....	3,484	....	4,682
Totals	9,717	153,430	9,574	153,415

WILLIAMSBURG BRIDGE—TRAFFIC COUNT—OCTOBER 30, 1913.

Total Traffic for 24 Hours (ER—26B).

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Elevated Trains	285	....	285	....
Elevated Cars	1,388	62,696	1,388	67,215
Surface Cars—				
Brooklyn Rapid Transit.....	2,052	30,546	2,043	37,899
Concy Island & Brooklyn.....	232	1,844	232	2,269
Bridge Local	641	19,342	642	19,552
New York Railways Co.....	1,236	22,797	1,249	19,919
Third Avenue	379	5,720	368	5,682
	4,540	80,249	4,534	85,321
Trucks—				
One-Horse	1,423	2,327	1,439	2,421
Two-Horse	811	1,392	739	1,286
Three (or more) Horse.....	53	73	63	111
Motor	449	944	385	799
	2,736	4,736	2,626	4,617
Carriages, Etc.—				
One-Horse	80	133	83	148
Two-Horse	107	386	106	386
Passenger Autos	764	2,136	726	1,937
Led Horses	43	34	22	20
Miscellaneous	66	66	58	62
	1,060	2,755	995	2,553
Pedestrians .....	....	1,503	....	1,702
Totals	9,724	151,939	9,543	161,408

MANHATTAN BRIDGE—TRAFFIC COUNT—OCTOBER 30, 1913.

Total Traffic for 24 Hours (ER—27B).

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Surface Cars—				
Brooklyn & North River R. R. Co.	468	9,474	464	8,679
Manhattan Br. Three Cent Line..	332	6,500	336	6,535
	800	15,974	800	15,214

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Trucks—				
One-Horse	1,001	1,347	927	1,274
Two-Horse	695	1,049	679	1,009
Three (or more) Horse.....	77	94	72	113
Motor	540	1,044	558	1,172
	2,314	3,534	2,236	3,568
Carriages, Etc.—				
One-Horse	36	62	38	72
Two-Horse	40	147	39	156
Passenger Autos	589	1,417	636	1,789
Led Horses	20	13	26	22
Miscellaneous	43	43	29	29
	728	1,682	768	2,068
Pedestrians .....	....	932	....	848
Totals	3,842	22,122	3,804	21,698

QUEENSBORO BRIDGE—TRAFFIC COUNT—OCTOBER 30, 1913.

Total Traffic for 24 Hours (ER—27B).

	To Manhattan.		From Manhattan.	
	Vehicles.	Persons.	Vehicles.	Persons.
Surface Cars—				
New York & Queens Co. Ry. Co..	904	18,812	909	19,938
Third Avenue Bridge Co.....	256	6,956	255	5,729
Thompson Avenue Line.....	108	1,528	108	1,601
Bridge Local	213	3,559	212	3,815
	1,481	30,855	1,484	31,083
Trucks—				
One-Horse	275	372	324	436
Two-Horse	306	440	338	482
Three (or more) Horse.....	72	80	85	98
Motor	575	1,280	565	1,173
	1,228	2,172	1,312	2,189
Carriages, Etc.—				
One-Horse	40	69	34	56
Two-Horse	194	725	166	720
Passenger Autos	1,690	4,309	1,708	4,291
Bicycle or Motorcycle.....	73	76	80	89
Led Horses	33	30	16	15
	2,030	5,209	2,004	5,171
Pedestrians .....	....	1,018	....	1,283
Totals	4,739	39,254	4,800	39,726

COMPARISON OF TRAFFIC OVER EAST RIVER BRIDGES—THURSDAY, OCTOBER 24, 1912—THURSDAY,
OCTOBER 30, 1913.
Total Traffic for 24 Hours (ER—29B).

	Brooklyn Bridge.		Manhattan Bridge.		Williamsburg Bridge.		Queensboro Bridge.		Total Traffic East River Bridges.	
	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.
Traffic to Manhattan.										
Elevated Railroad Cars.....	3,745	3,676	....	....	971	1,388	....	....	4,716	5,064
Surface Railway Cars.....	4,004	3,861	242	800	4,535	4,540	1,394	1,481	10,175	10,682
Vehicles	1,962	2,180	2,400	3,042	3,000	3,796	1,774	3,258	9,136	12,276
Elevated Railroad Passengers.....	110,098	94,716	....	....	34,976	62,696	....	....	145,074	157,412
Surface Railway Passengers.....	56,400	51,587	2,356	15,974	76,548	80,249	25,273	30,855	160,577	178,665
Passengers in Vehicles.....	2,937	3,643	4,154	5,216	5,495	7,491	3,816	7,381	16,402	23,731
Pedestrians	3,002	3,484	788	932	1,182	1,503	634	1,018	5,606	6,937
Total People Crossing Bridges.....	172,437	153,430	7,298	22,122	118,201	151,939	29,723	39,254	327,659	366,745
Traffic from Manhattan.										
Elevated Railroad Cars.....	3,745	3,676	....	....	973	1,388	....	....	4,718	5,064
Surface Railway Cars.....	4,013	3,864	240	800	4,545	4,534	1,402	1,484	10,240	10,682
Vehicles	1,951	2,034	2,423	3,004	2,924	3,621	1,870	3,316	9,168	11,975
Elevated Railroad Passengers.....	101,019	90,170	....	....	37,672	67,215	....	....	138,691	157,385
Surface Railway Passengers.....	63,493	54,902	2,442	15,214	78,647	85,321	25,579	31,083	170,161	186,520
Passengers in Vehicles.....	3,039	3,661	4,160	5,636	5,383	7,170	4,003	7,360	16,585	23,827
Pedestrians	4,280	4,682	710	848	986	1,702	519	1,283	6,495	8,515
Total People Crossing Bridges.....	171,831	153,415	7,312	21,698	122,688	161,408	30,101	39,726	331,932	376,247
Total Traffic Both Directions.										
Elevated Railroad Cars.....	7,490	7,352	....	....	1,944	2,776	....	....	9,434	10,128
Surface Railway Cars.....	8,017	7,725	482	1,600	9,080	9,074	2,796	2,965	20,375	21,364
Vehicles	3,913	4,214	4,823	6,046	5,924	7,417	3,644	6,574	18,304	24,251
Elevated Railroad Passengers.....	211,117	184,886	....	....	72,648	129,911	....	....	283,765	314,797
Surface Railway Passengers.....	119,893	106,489	4,798	31,188	155,195	165,570	50,852	61,938	330,738	365,185
Passengers in Vehicles.....	5,976	7,304	8,314	10,852	10,878	14,661	7,819	14,741	32,987	47,558
Pedestrians	7,282	8,166	1,498	1,780	2,168	3,205	1,153	2,301	12,101	15,452
Total People Crossing Bridges.....	344,268	306,845	14,610	43,820	240,889	313,347	59,824	78,980	659,591	742,992
Per Cent. of Change from Preceding Year....	+0.5	-10.8	+59.6	+200.0	+4.3	+30.1	+25.5	+32.0	+4.7	+12.6
Per Cent. of Total East River Bridge Traffic...	52.2	41.3	2.2	5.9	36.5	42.2	9.1	10.6	100.0	100.0

COMPARISON OF TRAFFIC OVER EAST RIVER BRIDGES—THURSDAY,
OCTOBER 24, 1912—THURSDAY, OCTOBER 30, 1913.

Elevated and Surface Car Traffic during Rush Hours (ER—30B).

	Brooklyn Bridge. 7.00 to 9.00.		Manhattan Bridge. 6.30 to 8.30.		Williamsburg Bridge. 6.30 to 8.30.		Queensboro Bridge. 6.30 to 8.30.	
	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.
Morning Traffic to Man- hattan.								
Elevated Railroad Cars.....	660	594	....	....	240	356	....	....
Surface Railroad Cars.....	565	551	29	122	732	705	247	254
Elevated Railroad Passen- gers	54,966	44,823	....	....	20,234	35,279	....	....
Surface Railroad Passengers	21,438	19,574	623	5,357	33,885	33,486	9,074	10,054
Total Passengers...	76,404	64,397	623	5,357	54,119	68,765	9,074	10,054

	Brooklyn Bridge. 5.00 to 7.00.		Manhattan Bridge. 5.00 to 7.00.		Williamsburg Bridge. 5.00 to 7.00.		Queensboro Bridge. 5.00 to 7.00.	
	1912.	1913.	1912.	1913.	1912.	1913.	1912.	1913.
Evening Traffic from Man- hattan.								
Elevated Railroad Cars.....	633	587	....	....	239	354	....	....
Surface Railroad Cars.....	601	522	30	128	779	754	203	251
Elevated Railroad Passen- gers	51,400	43,642	....	....	19,328	39,001	....	....
Surface Railroad Passengers	26,267	21,738	657	5,909	32,341	32,713	9,188	10,304
Total Passengers...	77,667	65,380	657	5,909	51,669	71,714	9,188	10,304
Average No. of Persons per Elev. Car	82	75	....	....	83	105	....	....
Average No. of Persons per Surf. Car	42	39	22	45	43	46	41	40

ANNUAL TRAFFIC COUNT—DIVISION OF EAST RIVER BRIDGES,
EAST BOUND ELEVATED RAILROAD TRAFFIC.

Thursday, October 24, 1912, Compared with Thursday, October 30, 1913 (ER—31B).

Items.	Total for Passengers on Both Bridges.	Brooklyn Bridge Passengers from Park Row.	Williamsburg Bridge Passengers.			
			Total.	From Chambers Street.	From Canal Street.	From Essex Street.
1. For 24 Hours—October 24, 1912.....	138,691	101,019	37,672	.....	.....	37,672
2. For 24 hours—October 30, 1913.....	157,385	90,170	67,215	.....	9,066	18,776
3. Increase (+) or Decrease (—), 1913.....	+18,694	-10,849	+29,543	.....	9,066	-18,896
4. Per Cent. of (3).....	13.5	-10.7	78.7	.....	.....	-50.2
5. Per Cent. of Total Traffic, 1912.....	100.0	72.8	27.2	.....	.....	.....
6. Per Cent. of Total Traffic, 1913.....	100.0	57.3	42.7	.....	.....	.....
7. Per Cent. of Williamsburg Traffic, 1913.....	.....	.....	100.0	22.1	15.0	27.9
8. Rush Hour Traffic—October 24, 1912:						
4.00 to 4.30 p. m.....	4,296	3,881	415	.....	.....	415
4.30 to 5.00 p. m.....	5,200	4,375	825	.....	.....	825
5.00 to 5.30 p. m.....	18,635	15,750	2,885	.....	.....	2,885
5.30 to 6.00 p. m.....	23,032	18,096	4,936	.....	.....	4,936
6.00 to 6.30 p. m.....	18,038	11,290	6,748	.....	.....	6,748
6.30 to 7.00 p. m.....	11,431	6,264	5,167	.....	.....	5,167
7.00 to 7.30 p. m.....	5,858	3,381	2,477	.....	.....	2,477
7.30 to 8.00 p. m.....	3,345	2,206	1,139	.....	.....	1,139
Total for 4 Hours.....	89,835	65,243	24,592	.....	.....	24,592
9. Rush Hour Traffic—October 30, 1913:						
4.00 to 4.30 p. m.....	4,208	2,965	1,243	.....	147	347
4.30 to 5.00 p. m.....	5,911	3,652	2,259	308	359	780
5.00 to 5.30 p. m.....	20,071	12,126	7,945	612	1,344	1,926
5.30 to 6.00 p. m.....	27,944	15,251	12,693	3,531	1,669	3,874
6.00 to 6.30 p. m.....	23,158	10,294	12,864	4,883	1,745	2,267
6.30 to 7.00 p. m.....	11,470	5,971	5,499	2,549	730	1,269
7.00 to 7.30 p. m.....	6,850	3,909	2,941	951	920	1,288
7.30 to 8.00 p. m.....	5,304	3,067	2,237	343	480	1,313
Total for 4 Hours.....	104,916	57,235	47,681	13,372	378	928
Total for 4 Hours.....	104,916	57,235	47,681	13,372	7,042	9,386

BROOKLYN BRIDGE

Maintenance

The routine cleaning of the bridge, approaches, etc., comprises the daily sweepings and cleaning of the bridge roadways, 23,500 square yards; promenade, 10,000 square yards; sidewalks, etc., at street level, 9,800 square yards; lower and mezzanine floor at the New York Station, 9,000 square yards; lower floor of the Brooklyn Station, 2,200 square yards; total 54,500 square yards. The cleaning of the upper floors in the two stations is attended to by the elevated railroad company. The bridge forces have also to clean and maintain the bridge office at 179 Washington street, the yards and shops at Nassau street, and the three public comfort stations now in service,—the use of the fourth comfort station having been discontinued on account of the alterations in the New York Station made necessary by the subway connection construction. The maintenance of the lighting system is also attended to by the bridge forces. This work includes the routine trimming, cleaning and inspection of all lamps, also the inspection and repair of all lighting feeder cables, switchboards, electric tools and apparatus.

The routine painting of the structure consisted during the year of cleaning, by brush and chipping hammer where necessary, and painting with structure color of the main cables, New York Land Span; intersections of all suspenders and overfloor stays; seizings and hand lines of cables on all spans; cable posts and cables below the roadway level on the land spans; and the bottom chords of the stiffening trusses. The new cover plates on the main truss bottom chords and the new steel roadway curbs were given a priming coat of red lead and a final coat of structure color. In addition, the interior of the bridge office, and of the comfort stations, the bridges over York, Main and Concord streets, and the elevated railroad deck on the Brooklyn approach, were painted. The materials for paint for this bridge and the Manhattan Bridge were bought separately under contract, and machine-mixed in the shops of the Brooklyn Bridge by Department painters.

In addition to minor repairs to railings, fixtures, fittings, stair treads, roadway floors, etc., on the main bridge, approaches, terminals and in the buildings and warehouses under the approaches, the following work has been completed during the year or is now in progress:

Reinforcing all the lower chord channels in the plane of the over floor stays with new cover plates and tie plates. This work has been completed on the river spans.

Stiffening the top chord channels of the four interior trusses at splice points. New cover plates are riveted on over the bottom flanges of the channels across the joints. This also aids in the alignment of the chords. About 75 per cent. of this work on the New York Land Span is completed.

Rebuilding the end floor beams, truss seats and end truss connections at the panel adjacent to each anchorage. This work has been completed at the New York anchorage, and is now in progress at the Brooklyn anchorage.

Constructing a cantilever anchor system for the stiffening trusses on each side of the main piers. This work has been completed at the Brooklyn tower, and is now under way at the New York tower. Repairs to the intermediate floor beams at the Brooklyn tower are about 75 per cent. completed.

Adjustment, in general, of the stiffening truss diagonals and counter bars to conform to increased traffic conditions. This work is being done at all times. In this connection the diagonal bars and counters are inspected twice daily over the entire structure for any signs of unusual wear. In addition, a system of special inspection is now in progress, in which the lower chord pins and truss members at each panel point are scraped free from all paint, the parts of the members examined carefully with a reading glass and, if conditions do not call for repairs, immediately repainted.

Lifting cable posts, inspecting and making repairs, where the cables are below the level of the stiffening trusses on the land spans. These repairs consist of the removal of the post and saddle, repairs to and truing up of the parts in the shops where necessary, removal of wire wrapping and canvas around cable, examination of cable wires, rewinding and painting, and all necessary repairs to the sway rod and floor beam connections to the posts. This work, now in progress on the New York Land Span, was started at the anchorages and has progressed as follows during the past year: Cable A, Posts 106 to 96; Cable B, Posts 112 to 108; Cable C, Posts 111 to 107; Cable D, Posts 106 to 98.

Loose rivets in the stiffening truss chords and in the connections of track stringers to floor beams have been cut out and new rivets driven. This work is progressing as opportunity offers. New seizings or clamps for connecting the suspenders to the overfloor stays have been completed over the entire structure.

In addition to repairs and replacements on the main bridge superstructure, considerable work has been done on the repair and reinforcement of the smaller bridges in the approaches,—notably, the Franklin Square Bridge and York Street Bridge. Also in connection with the work now going on for the Manhattan Subway Connection contract, new railing posts and trolley poles have been erected at the Franklin Square Bridge, and new track stringers and bracing on the elevated railroad incline leading to the New York Station. The old ornamental cast iron railings at Franklin Square were removed and new heavy wrought iron pipe railings erected to meet the railings put in between the trolley and elevated railroad tracks for the subway connection work, the material having been furnished ready for erection under the aims of the previous roadway widening contract.

During the year the two roadways on the Brooklyn approach and the south roadway on the Manhattan approach were repaved with granite blocks, the former being done under contract and the latter by Departmental labor. The old blocks were 8 inches in depth on a 2-inch sand cushion and with tar and gravel joints. The new blocks are 5 inches in depth on a 1-inch sand cushion, with cement grout joints. The new paving is more suitable for traffic in the even, uniform surface presented, and will undoubtedly not only require less renewals, but these renewals will also be less expensive.

The contract for repaving the Brooklyn approach roadway was let in the fall of 1912, but the work was deferred until May of the present year on account of bad weather and delays in delivery of materials. On May 20, the north roadway was closed to all heavy vehicular traffic. On June 16, the south roadway was similarly closed, the north roadway having then been made ready for all traffic. The south roadway was opened to all traffic on August 4, the paving work having then been completed on both roadways. During the time these roadways were closed, there was no interruption to street car traffic and light automobiles, fire apparatus and U. S. mail wagons were allowed to cross.

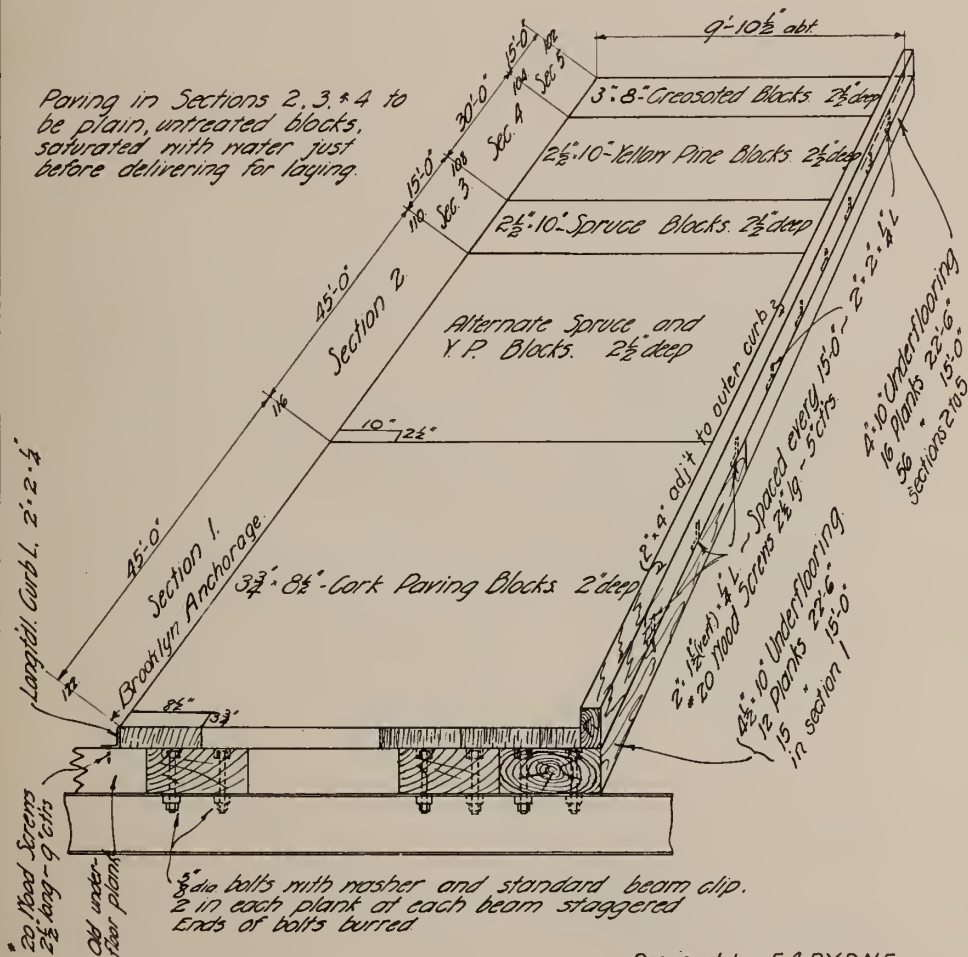
In connection with the work of repaving under contract with this Department, the granite block paving between and immediately adjacent to the surface track rails was relaid by the operating company. The 5-inch tee rails from Sands street west to the dividing switches on the Brooklyn approach were also replaced by the operating company, new 7-inch girder rails being used.

While each roadway was closed, all the available force was set to work at replanking the roadway from outer car track rail to outer curb, removing the longitudinal planking between the rails and replacing with transverse planking and putting in new creosoted timber for the underflooring, where necessary. The granite block repaving work on the south roadway of the Manhattan approach was also completed while the south roadway was closed.

DEPT. OF BRIDGES — CITY OF NEW YORK
 BROOKLYN BRIDGE
 EXPERIMENTAL ROADWAY PAVING

1913

New paving and underflooring laid as per sketch below.



Devised by E.A. BYRNE

EB

During the year—advantage being taken of the closing of the roadways—a new steel roadway curb was erected on the main bridge, replacing the old wooden curbs. The new construction, in addition to reducing the excessive splintering of the roadway planking adjacent to the curb, also gives better opportunity for painting and cleaning and for keeping the dirt from the trusses and floor beams. The outer curbs have been erected for the entire length of both roadways, with the exception of the apron plates and intermediate posts, and work is now in progress on erecting the inner curbs. These inner curbs, being just inside the car tracks, can be erected only when the surface car travel is at its minimum; and, in consequence, progress on this work is not so rapid as in the case of the outer curbs.

In order to lessen the objectionable jolting of the vehicles passing over the steel plates located at the main expansion joints on each roadway, a new design for these joints was made, and work is now under way in the shops on these plates and connections.

Plans were made and work is now under way on the preparation of the materials necessary for laying new underflooring and test sections of various paving blocks, proposed as substitutes for the present roadway planking on the main bridge. The present roadway construction consists of $2\frac{1}{2}$ x 10-inch spruce upper deck transverse planking, laid on 4 x 10-inch creosoted yellow pine longitudinal underflooring, supported on the steel cross beams and with about 40 inches in the clear between supports. The choice of a new construction is limited by the fact that any substitute for the present light construction must not add to the dead load on the structure. The test sections are to be laid on the north roadway from the Brooklyn anchorage west to Point 102, a distance of 150 feet, at the first favorable opportunity for doing the work without undue interruption to traffic. The annual cost for spruce plank for deck renewals exclusive of labor cost is at present about \$11,000.00, and a force of carpenters is kept continuously at work on repairing. This deck from outer track rail to outer curb has to be entirely relaid twice during the year, the work being done by Department labor. In addition, constant supervision and immediate renewals are required to prevent accidents and wear through to the underflooring.

Electrical observations during the period have consisted only of the work done in connection with the further investigation of conditions as outlined in last year's reports and plans of this Department relative to increasing the capacity of the present negative feeder system of the elevated and surface railway lines. Fires occurred in the planking between the rails of the surface car tracks on April 22, May 16, August 9, and August 17. The fires were put out by Departmental employees, and no damage was done to the structure. In the investigation of previous fires in the roadway planking it was found that these fires were probably due to the overheating from heavy return current of the track rail bonds and tie rods in direct contact with the planking. A fire occurred on the scaffold used for cable post repair under the deck of the New York Land Span on December 8. Traffic was suspended on one roadway for a short time. There was no damage to the structure, except a slight scorching of the paint on a horizontal sway cable, and the insulation on one power feeder cable. There was some slight damage to materials on the scaffold. A fire also occurred on December 20 in the building owned by this Department at 281 Front Street, Manhattan. The second and third floors were damaged to the extent of \$1,500.00.

On account of the funeral of the late Mayor William J. Gaynor, on Monday, September 22, it was decided that certain traffic conditions should be observed while the line of march was passing over the bridge. Accordingly, trolley cars were not operated across the bridge from 11:05 A. M. to 2:06 P. M., and no railroad trains were operated from 12:04 to 1:48 P. M. Foot passengers and all vehicles, other than those in the line of march, were also kept off the bridge during the period.



CAST IRON AND CONCRETE MARGINAL PAVING BLOCKS. DESIGNED BY E. A. BYRNE. 1913.

In the contract for the subway connection construction, provision was made for a passageway for pedestrians under the William Street construction owing to the necessary closing of William and North William Streets. This passageway was opened to the public on July 21.

The inspection of the surface car tracks across the structure, made at different times during the year, indicate that there were several points at which the track was in such condition as to cause certain cars with low equipment to rip up and break away the transverse planking between the rails. Immediate repairs at these points were made by the operating company as directed by this Department in accordance with the original agreement to maintain and repair these tracks. Plans have also been prepared by the Department for the reconstruction of these tracks over the entire main bridge structure, from anchorage to anchorage. The present construction consists of 4½-inch 70-pound tee rails supported every 21 inches on rail chairs and bolted directly to the underflooring planks, which are 4 inches in depth with a clear span of 40 inches. Under the heavy trolley cars now in use and with the great amount of traffic crossing the bridge, these rail chairs have sunk down into the underfloor, and the track is in consequence difficult to maintain. Plans have been prepared for a girder rail construction, supported directly by but insulated from the steel floor beams. This proposed construction will afford a more stable track, lessen the impact on the structure; will protect the rail bonds and keep them free from contact with the planking and will lessen the delays and damage to vehicles at present caused by the difference in level between the track floor and the outer part of the roadway.

Observations taken of elevated railroad train speeds during rush hours indicate that, in general, during these hours trains are not run over the maximum allowed speed of 15 miles per hour across the structure. These observations are taken twice monthly. During the latter part of the year the installation was completed of an automatic, clock regulated, train speed recording system. This consists, in brief, of track contacts actuated by each passing car wheel, spaced every 660 feet across the structure on each track and wired to batteries and pen magnets in a clock mechanism in the bridge office in such manner that a complete chart record of the speed and movements of all trains crossing the bridge during any period, up to 24 hours, may be obtained. This is the first time a mechanism of this design has been applied for such purpose.

The elevated railroad train service to Park Row, Manhattan, has been reduced during the latter half of the year, in the afternoon rush hours, on an average, as follows: 4:00 to 5:00 P. M. from 55 trains to 50 trains; 5:00 to 6:00 P. M. from 54 trains to 51 trains; 6:00 to 7:00 P. M. from 53 trains to 49 trains. This reduction in service on the Brooklyn Bridge followed soon after the initial operation of trains across the Williamsburg Bridge and through the Centre Street Loop to Chambers street. The morning rush hour service, although not so large as in preceding years, has been kept practically constant through the year, a maximum of 56 trains per hour being operated. The present train spacing signal system and the speed limitation of 15 miles per hour have not caused this reduction, as 66 trains per hour can be brought into the terminal under practical operating conditions, and a maximum of 62 trains per hour daily operation has been attained in previous years without violating these conditions.

The total number of elevated railroad car trips on the bridge was 1,387,522, as given in detail in the accompanying tables. Approximately 46 per cent. of the total number of cars during week days cross the bridge in six hours of the twenty-four, namely, from 6.30 to 9.30 A. M. and 4.30 to 7.30 P. M. The following delays occurred to traffic during the year:

CAUSES OF DELAY.

	Total Number.	Total Time	
		Hrs.	Min.
From defective car equipment.....	186	10	2
From collisions and accidents.....	3	1	39
From miscellaneous causes.....	60	6	22

—or a total delay in time of 18.05 hours, giving an average delay per 1,000 cars of only 0.8 minutes for the entire year.

ELEVATED RAILROAD CAR SERVICE, SHOWING NUMBER OF TRIPS FOR EACH LINE.

Lines.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
Myrtle Avenue	53,952	57,237	54,124	52,747	218,060
Lexington Avenue	53,610	55,662	50,196	48,144	207,612
Fulton Street	65,899	68,513	68,250	68,038	270,700
Brighton Beach	43,119	58,889	74,732	45,737	222,477
Fifth Avenue	44,807	45,797	44,749	46,645	181,998
West End	35,235	38,016	38,834	42,387	154,472
Culver	21,930	23,612	23,816	23,541	92,899
Sea Beach	11,470	10,982	11,293	3,652	37,397
Shuttle service	1,415	215	205	72	1,907
Totals, 1913	331,437	358,923	366,199	330,963	1,387,522
Totals, 1912	348,162	359,461	365,515	335,897	1,409,035
Reduction in 1913.....	16,725	538	.....	4,934	21,513
Increase in 1913.....	.....	.....	684	.....	.....

The total number of surface cars operated to the Manhattan terminal loops during the year was 1,397,628, as given in detail in the accompanying tables. The following delays occurred during the year:

CAUSES OF DELAY.

	Total Number.	Total Time	
		Hrs.	Min.
Defective car equipment.....	867	35	8
Derailments	139	8	42
Collisions and accidents.....	136	6	21
Trolley wire repairs.....	494	66	53
Vehicular traffic	445	27	2
Miscellaneous causes	91	12	51

—or a total delay in time of 156.9 hours, giving an average per 1,000 cars of only 6.8 minutes for the entire year. On this bridge, the cars and vehicles being on the same roadway, delays from vehicles are inevitable, even with the stringent traffic regulations now in force.

SURFACE RAILWAY CAR SERVICE, SHOWING NUMBER OF TRIPS FOR
EACH LINE.

Lines.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
Fulton Street	17,603	17,665	17,810	17,887	70,965
Putnam Avenue	24,537	24,377	24,487	24,419	97,820
Gates Avenue	31,629	32,127	32,329	30,613	126,698
Myrtle Avenue	20,420	20,670	20,972	20,481	82,543
Knickerbocker Avenue ...	6,067	6,295	5,924	6,209	24,495
Flatbush Avenue	22,519	22,852	23,494	22,420	91,285
Court Street	28,027	27,895	26,908	26,379	109,209
Graham Avenue	29,694	29,644	29,293	28,979	117,610
Flushing Avenue	9,866	10,311	10,734	10,289	41,200
Seventh Avenue	6,995	7,176	6,813	7,026	28,010
Park Avenue	6,373	6,713	5,399	3,949	22,434
Bergen Street	17,168	17,413	17,602	18,472	70,655
Vanderbilt Avenue	18,125	18,281	18,176	18,137	72,719
Union Street	16,813	17,598	17,666	17,108	69,185
DeKalb Avenue	31,468	31,471	31,209	32,855	127,003
Smith Street	29,164	30,954	31,389	28,783	120,290
Specials	372	357	306	296	1,331
Bridge locals	31,368	32,101	31,087	29,620	124,176
Totals, 1913	348,208	353,900	351,598	343,922	1,397,628
Totals, 1912	364,890	374,580	372,924	362,216	1,474,610
Reduction in 1913.....	16,682	20,680	21,326	18,294	76,982

**BROOKLYN BRIDGE—SUBWAY CONNECTION FOR THE
MANHATTAN TERMINAL**

In order to complete the loop system for the Brooklyn elevated lines, whereby trains may be operated on continuous trips over the Williamsburg Bridge and the Manhattan Bridge, into the Centre Street Subway and thence over the Brooklyn Bridge, plans were completed and a contract let in 1912 for the connection between the elevated railroad tracks on the Manhattan approach of the Brooklyn Bridge and the Centre Street Subway tracks under the new Municipal Building. When these tracks are completed, it will be feasible to operate trains from the Brooklyn Bridge as part of the bridge loop system or into the station under the Municipal Building as a terminal.

This subway connection is a part of the general plan for the reconstruction of the present terminal building, which in its final development will comprise an upper deck for elevated trains; a mezzanine floor for trolley loops, where incoming and outgoing passengers will be separated; a ground floor leading to the footwalk on the bridge and affording access by means of escalators and stairways to the trolley loops and elevated platforms; and the subway connection at present under construction. To provide for reconstructing this terminal, it is necessary to take out the elevated railway traffic, and to do this the subway connection to the Municipal Building station had first to be constructed.

Prior to the construction of this subway connection, it was necessary to widen the roadways on the Manhattan Approach, from the Franklin Square Bridge west to Rose street. This work was done under a contract with the Cooper and Evans Co., dated July 8, 1907, and was completed September 21, 1908, at a cost of \$111,235.

The subway connection consists in brief of two tracks, each running parallel to and outside the present elevated railway tracks, in open cut from a turnout at the west end of the Franklin Square Bridge near the Manhattan Anchorage, to near the west end of the terminal building, thence in tunnel under the trolley floor level of the

station and on a curve to a point near the northwest corner of the station, where the two tracks are carried together in a subway under Park Row to a connection with the tracks in the southerly end of the Municipal Building basement.

In order to bring the tracks under the lower floor construction of the terminal building and thence down to the subway track elevation, it was necessary to carry these at a 5.28 per cent. grade, the grade of the other tracks and the roadways being 3.25 per cent. The new grade is compensated for on the curves, thus making it no more difficult for operation than a 5.28 per cent. grade on a tangent. The grades as now established for the approaches of the three bridges connected by the Centre Street Loop is as follows:

Manhattan end, Brooklyn Bridge.....	5.28	per cent.
Manhattan end, Manhattan Bridge.....	5.056	per cent.
Brooklyn end, Manhattan Bridge.....	5.4	per cent.
Manhattan end, Williamsburg Bridge.....	4.6	per cent.
Brooklyn end, Williamsburg Bridge.....	5.1	per cent. (in proposed subway)

Elevated railroad service is now being operated across the Williamsburg Bridge with four motor cars to a six-car train on the 4.6 per cent. grade on the Manhattan Approach, and no difficulties have been experienced. The Boston and Philadelphia subways are operating over grades of 5 per cent. but with trains composed entirely of motor cars. The McAdoo tunnels have grades of 5 per cent. and, though the trains are made up of motor cars entirely, if, for any reason, a car is disabled, the train will haul it up the grade. No difficulty is anticipated in operating over this 5.28 per cent. grade with the trains as at present made up; namely, four motor cars and two trailers.

The contract for the work now being done was executed by this Department, for the City, and the North Eastern Construction Company on July 16, 1912. The total contract price was \$408,883.50. Among the principal items of the contract are: Excavation, 10,500 cubic yards; masonry removed, 13,000 cubic yards; concrete, 8,000 cubic yards; waterproofing, 60,000 square feet; structural steel, 1,350 tons. The work covers in general: Lowering existing tracks near easterly end of Franklin Square Bridge; cutting out masonry on the approach, including cutting through the large arches spanning Rose, Vandewater, William and North William Streets and replacing with steel girder spans; steel and concrete construction and waterproofing of the floors and side walls of the cut; new floor construction in the station over the cut; construction of new supports for the station columns where necessary; alterations to stairways; construction of underground passageway at William street and new sewers, catch basins, pavements, etc., at this street and North William street; changes in the warehouses under the approach; and the maintenance of all traffic on the structure and in the streets during construction.

The Contractor was ordered to begin work immediately after the certification of the contract by the Comptroller on August 9, 1912. Considerable delay was experienced at first on account of the concluding acts necessary for the closing of William and North William streets, and for the preparation of plans and studies in connection with changes suggested by the Public Service Commission for the proposed Nassau Street Subway. As a consequence only about seven per cent. of the work had been completed on December 31, 1912. This work consisted, in brief, of relocation of the pneumatic mail tubes crossing the bridge, excavation at William and North William streets, cutting through the old masonry on the approach and the shoring of columns.

The progress of the work during the year 1913 has been as follows:

Franklin Square Span.

The reconstruction of the floor system was completed on the south side and about 20 per cent. only of the work on the north side remains to be done.

North Subway Track.

Masonry cut through to sub-grade and to width required for entire length, except for turnout cut, east end. Steel construction to replace portions cut out of arches over Rose and Vandewater streets, completed. The steel and concrete for the floor and walls of the open cut entirely placed, except as noted below. Walls, roof and floor of the subway in the station completed from Rose street to North William street. Of the remaining construction in the station, the columns and concrete wall on the north side were put in place. Timber supports were erected under the roadway beams and arch ring on William street.

South Subway Track.

Masonry cut through to sub-grade and to width required, except for turnout at east end and the section east of Rose Street between arches 12 and 17. Steel construction to replace portions cut out of arches over Rose and Vandewater streets, completed. Permanent columns and girders to support station columns at North William street erected. Walls built up from street level under the William street arch. Floor construction for open cut completed, except as noted below; floors, walls and roof construction under station floor completed to William street only. East bound trolley tracks relocated.

Of the two sections above, there remains to be done: the lowering of the present railroad tracks and the cutting and reconstruction for the turnouts at the east end of Franklin Square Bridge for both tracks; the completion of the wall and floor construction of the open cut between arches 14 and 17 east of Rose street on the north track, all of the walls and that part of the floor from arches 11 to 17 on the south track; wall, floor, and roof construction in the station, except as noted above on each track; and the erection of the steel work, walls and floors of the north track to replace the arch at William Street.

Closing William and North William Streets.

The passageway under William street was practically completed, water mains and duct lines removed, and the sewers, water mains and temporary paving in new street constructed.

Construction Under Park Row.

In this section about 65 per cent. of the earth excavation and the construction of the steel columns and concrete in the north wall were completed. Some delay was experienced in this section while the Third Avenue Railway Company was removing the old cableway yokes, which projected below the subway roof construction. There remains to be done the rest of the subway excavation, the construction of the south wall and of the steel girders and roof, the erection of new girders under curb, and the necessary cutting through the wall at the Municipal Building.

At the end of the year about 72 per cent. of the entire work had been completed. An average daily force of 100 men was employed during the period. There were no unusual delays or tie-ups in the progress of the work, although, as it was deemed inadvisable to undermine both sides of the station at once, the contractor's efforts were confined to a smaller area than would have been the case otherwise. The contract has necessitated considerable skill in its performance in order to secure uninterrupted traffic at this extremely congested location and to safeguard the public and maintain the stability of the structure while the work was going on.

PROPOSED BROOKLYN APPROACH TO BROOKLYN BRIDGE

Suggesting Location for Kings County Court House

The accompanying picture shows a proposed Kings County Court House as suggested by the Commissioner of Bridges, which in size far exceeds anything that

has yet been suggested, and is a monumental type of structure of the Grecian school. The building is located on the ground which it was proposed to take for parking purposes, in connection with the reconstruction of the Brooklyn Bridge Terminal, bounded by Washington, Fulton and Liberty Streets, in the Borough of Brooklyn, and the picture shows what can be done on this property after the plans of the Bridge Department for the removal of the elevated tracks in Fulton Street and the contemplated changes in the Brooklyn Bridge station have been carried out.

The building itself is some 160 feet broad and 425 feet long, covering an area of 340,000 square feet; this means a building over two city blocks long. It will be five stories high and have good light on all sides. It is designed to have a passageway running across the middle that can be used for pedestrians and teams, and can, if desired, be gated so that only teams making delivery at the building can use it.

The court house is so located that there is wide space all around it. It is from 175 to 200 feet (about one block) away from the proposed Brooklyn Bridge station. The elevated tracks at this point will run on a solid floor, with stone ballast, will be partially screened and practically noiseless. The building sets back from the present building line of Washington street, making this street 70 feet broad opposite the court house. On the opposite side, on Fulton street, it will be from 80 to 230 feet to the southerly building line of Fulton street.

With the streets in the neighborhood of the court house paved with soft wooden blocks, they will be as noiseless as it is possible to make city streets.

The car lines on Fulton street will be away from the building, and when the plans of the Department, which contemplate the removal of the elevated tracks from Fulton street, are carried out, this building will have a location that it will be hard to duplicate within an equal radius from the City Hall.

While the building is isolated, making it particularly adaptable for court house purposes, it is in the centre of transportation facilities; on the one end the Brooklyn Bridge, with its connections covering the whole of Manhattan, Bronx and Brooklyn; on the other end, but a short distance away from the present subway and the proposed new subway. With these lines of transportation almost at its doors, and street cars but a short distance away, it can be reached from any part of Greater New York. The location is close to the Federal Building and the United States Courts.

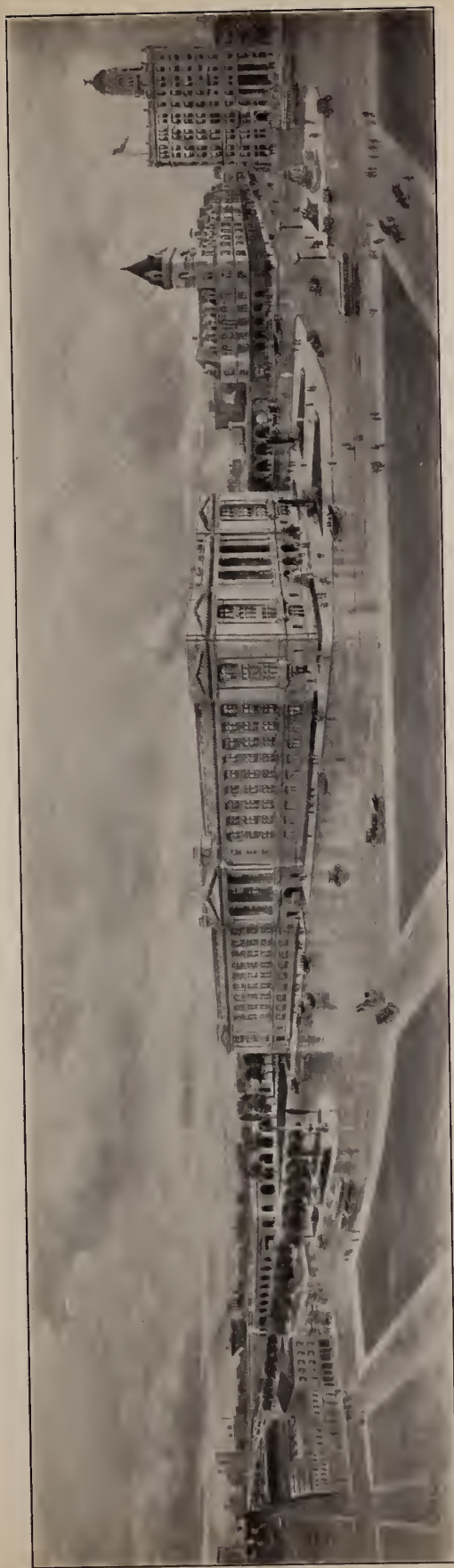
While the size and shape of it is new for a court house, it is no more than ample for the future needs of this great metropolis. It is five times as large as the present court house on City Hall Square, which with its overflow now takes care of the business. In its court rooms may be designed of almost any size and to fit almost any condition. The present court house has 26 rooms in which court is held. On the same basis this proposed court house may contain 130 rooms, so that it may at once be seen that the future is provided for.

It is designed to be constructed in light granite or other suitable stone, with copper window casings and trimmings. Viewed from the Borough Hall, it will have a small park in front of it and the end design thoroughly in keeping with this character of building, and as a whole a monument in Brooklyn around which a civic centre should grow.

MANHATTAN BRIDGE

Maintenance

As the plazas at each end of this bridge are now being constructed, and as one foot-walk, only, is opened to the public, the routine daily cleaning comprises only the sweeping and cleaning of 22,300 square yards of wood block paving, 4,400 square yards of temporary granite block paving, 8,000 square yards of foot-walk and trolley loop paving and 13,200 square yards of street areas. The lighting of the bridge and approaches is maintained by the lighting companies under contract with the Department of Water Supply, Gas & Electricity.



BROOKLYN BRIDGE—BROOKLYN APPROACH. SUGGESTION FOR KINGS COUNTY COURT HOUSE SITE. 1913.

At the beginning of the year all of the first coat of structural color had been applied to the bridge. The work of applying the second coat was continued, the following parts of the structure being completed during the year: interior and exterior of both main towers; truss web system, floors, railings, gratings and under the lower deck of the main bridge and Brooklyn Approach; under the upper deck of the river spans; cable bars, shoes and ends of strands in the anchorages. At the end of the year the construction painting was so nearly completed that the remainder is to be carried on as routine maintenance painting as on the older bridges, the force of painters being reduced in consequence by about 50 per cent. for the coming year.

The Manhattan Bridge has been opened to roadway traffic, only since December 31, 1909 and to surface car traffic since September 4, 1912, and is receiving only a fraction of the traffic it will eventually carry, hence the structural repairs have been few, consisting only of minor changes at the expansion joints, cutting clearances for suspender rods, repairs to the roadway railings, etc. Housings have been constructed over the roller bearings at each of the piers on the approaches, ladders made and erected on the outside of the main towers from the galleries up, and railings erected on the masonry piers at the main towers. The asphalt and concrete on the floors of the balconies at the towers were removed, owing to the rapid deterioration of this covering. The exposed surfaces of the buckle plates were scraped and painted.

Plans were completed and work is now under way on the installation of a steam heating plant in the upper rooms of the Manhattan Anchorage, similar to the heating system now installed in the Brooklyn Anchorage. Connections have been made with the street water supply, the steam pipe and fittings have been delivered and the preliminary work of cutting for supports, pipes, etc. completed. The work is being done by Department labor.

The fire alarm signal cables furnished by this Department have been completely installed by the Fire Department under an arrangement with that Department whereby the special signal cable for connecting the underground fire alarm telegraph system of the two boroughs was carried across this bridge. Signal boxes were also placed according to original requirements at equal intervals along the structure and connection made to the fire alarm systems of both Manhattan and Brooklyn Boroughs.

The fire protection system of this bridge was completed during the year by constructing cross connections between the lines of water pipe on each roadway. These cross connections are located at six points, namely at the two main towers, at the two anchorages and at the abutments. A test of the entire system was made November 7th under the direction of the Fire Department.

Plans have been made for the construction of trailer platforms to be operated in connection with the motor driven painters' platforms running on tracks under the deck of the main and side spans. With those auxiliary platforms it will be possible to have the entire area between any pair of floorbeams planked over, thus affording more protection to the workmen and better facilities for painting or repair work. Work has also progressed on the erection of new trolley hangers, and trolley wire for the operation of these platforms.

In accordance with a request from the Commissioner of Public Works, Manhattan, the block under the structure between Madison and Monroe streets was turned over to the Borough President for use as a corporation yard. Under the permit issued by this Department to the New York Municipal Railway Corporation, the installation of a high tension cable across the structure to the Centre Street Subway was completed. A temporary track for construction purposes in the subway, was also laid by this company. The Manhattan Bridge Three Cent Line under permit from this Department installed an aerial feeder line on the Brooklyn Plaza

and made a connection to the Department feeder cables at the Brooklyn abutment and at Sands street.

The Manhattan Bridge Three Cent Line began operation on September 6th of a new type of car for the heavier service required. The wheel boxes of these cars at places barely cleared the guard timbers on the lower deck tracks on the structure. As these tracks are to be used shortly for subway train operation, it was decided to order certain alterations to the car equipment instead of shifting or trimming off the guard timbers. These changes were accordingly made and the cars allowed to run on regular schedule.

The allied surface car companies organized under the name of the Brooklyn and North River Railroad Company discontinued running storage battery cars on the Manhattan Bridge on February 9th. Trolley cars are now operated from Fulton street, Brooklyn, to the Desbrosses street ferry, Manhattan. Cars are operated by overhead trolley from a plow changing pit on the Manhattan Plaza to Fulton street and by underground system in Manhattan Borough. A contract dated September 9, 1913 between the City and the above Company has superseded the permit of the Commissioner of Bridges, for the operation of cars over this bridge. By the terms of the contract, the local bridge service was discontinued and the loops and shelters for local passengers on the Brooklyn Plaza, removed.

SURFACE RAILWAY CAR SERVICE, SHOWING THE NUMBER OF TRIPS MADE BY EACH LINE.

	First. Quarter.	Second. Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
Manhattan Bridge Three Cent Line	27,759	30,439	29,950	30,100	118,248
Third Avenue Railway Line:					
Main Line	20,230	21,792	27,431	27,454	96,907
Bridge Local	15,162	13,707	13,720	4,392	46,981
Totals for 1913	63,151	65,938	71,101	61,946	262,136
Totals for 1912.....	.....	.....	5,673	40,558	46,231

PROPOSED BOULEVARD, CITY HALL TO MANHATTAN BRIDGE, 1913

A plan for the betterment of traffic across the two lower big bridges has just been developed by the Bridge Commissioner and is shown on the accompanying picture as a boulevard connecting City Hall Park with the Manhattan Bridge Plaza. When carried out this will provide wide and spacious driveways with the central parking space along its entire route making a fit approach to the new Manhattan Bridge from the vicinity of City Hall and diverting the heavy team traffic which now passes over the Brooklyn Bridge to the more spacious roadways of the Manhattan Bridge.

The Bridge Commissioner believes that effecting this plan would be a wise expenditure of money and a great help in the development of lower New York.

In order to make this new boulevard the City would have to acquire property in one block on Baxter street and four blocks on Canal street. It is proposed to widen Canal street by taking a strip 100 feet wide along the northerly side of said street between Baxter street and the Bowery and Baxter street is widened by taking a strip of property 100 feet wide on the easterly side from Harry Howard Square to Bayard street; from Bayard street south to Worth street the additional land acquired for the Boulevard would be taken from Columbus Park. Whatever



PROPOSED BOULEVARD—CITY HALL TO MANHATTAN BRIDGE. 1913.

property is necessary for the boulevard south of Worth street may be obtained by taking a strip from the land which will be acquired for the County Court House site, the proposed boulevard bounding this street on the easterly and southerly sides. As laid out the new street provides for two 50-foot driveways, two 20-foot sidewalks and a 35-foot parking space in the middle, the parking space to be laid out with trees, shrubs and benches and would provide a breathing space its entire length for the inhabitants of this congested district and serving the two purposes of a park and highway and affording a much needed thoroughfare, connecting up the civic center with City Hall Park and the Manhattan Bridge, which bridge is destined to be the great traffic highway across the East River.

Canal Street, the only east and west thoroughfare of sufficient width in its present condition but poorly accommodates the present day traffic going to and from the Manhattan Bridge and is often in a state of congestion near the bridge entrance.

Later on when the maximum of surface trolley cars to be operated over the bridge is added to the existing street traffic on Canal street there will be created an intolerable condition unless this street to the west of the bridge entrance is widened. This widening of Canal street will serve with the other streets radiating from Harry Howard Square to care for the traffic trending toward the west or north. There is, however, no present access to the south affording equal facilities unless it be assumed that Lafayette street would serve such purpose and this latter street to-day is a very busy thoroughfare affording no more than adequate facilities for the present day traffic.

The assessed valuation of the property taken in the four blocks on Canal street and one block on Baxter street amounts to \$1,800,000. and by devoting a part of Columbus Park and the property that is to be acquired for Court House purposes to the acquirements of this boulevard the total amount that would be expended for land is very small in comparison with the value of this new street to lower New York.

WILLIAMSBURG BRIDGE

Maintenance

The routine cleaning of this bridge comprises the daily sweeping and cleaning of the bridge roadways, 32,280 square yards; promenade (one) 16,003 square yards; street areas and Plaza, 53,974 square yards. The cleaning of the subway station at Delancey street is done by the railway companies under the terms of their original permit for operating cars. The bridge forces have also to maintain and clean the office at No. 400 Kent avenue, one trolley shelter on the Brooklyn Plaza, four public comfort stations on the structure, at the anchorages and an emergency hospital at the bridge entrance at Clinton street. As on the Brooklyn Bridge, the routine trimming, cleaning and inspection of all lamps, maintenance of lighting feeder cables, switchboards, electric tools and apparatus are done by Department labor.

Routine painting of the structure was continued during the year and included cleaning and painting with structure color the interior of the hoods over cable saddles at the towers; the interior of the Manhattan Main Tower; longitudinal trusses, 15 per cent, and transverse trusses, 75 per cent. of Main Span; floor system under north foot-walk Pt. 26 Manhattan Approach to Pt. 20, Manhattan Main Span; all suspender clamps on main span; cross struts, elevated floor system, main columns, foot-walk hangers, and drip pans over markets, Manhattan Approach; elevated railroad columns, Brooklyn Plaza; lattice railings in roadways, Manhattan Approach and main bridge, lattice railings on foot-walks, the latter complete except for a part of the Manhattan Approach. The new Bedford Avenue trolley station and the new trolley shelter on the Plaza were painted two coats. The materials for paint are bought separately and machine mixed by department painters at the Kent avenue shops.

The routine structural repair work during the year consisted of repairs of pipe and lattice railings on the roadways and foot-walks, renewals of stair treads, work on the hoods over main tower cable saddles, replacement of steel expansion joints in north roadway, Manhattan Approach; cutting out loose rivets and redriving in the conduit railway track yokes and stringers, Manhattan Approach, and renewal of steel underflooring channels on the roadway. Steel curb channels were put in place at Roebbling, Mangin, Goerck, Lewis, Norfolk and Tompkins streets. Portable sections of planking were constructed in the south trolley for fire prevention and painting purposes. Work on the Manhattan Approach was completed and 33 per cent. of the work on the Brooklyn Approach was done. The bases of the intermediate tower legs were cleaned out and concreted.

The trolley station at Bedford Avenue on the Brooklyn Approach for the accommodation of passengers on the east bound New York cars and west bound Brooklyn cars, work on which was started on January 14th, was completed on February 19th. This station is situated directly over the main footwalk which reaches the street level at Driggs Avenue and has stairways leading to Bedford Avenue. The platform bridges the gap and is on the level of the two lines of surface car tracks on the approach. The work was done entirely by Department labor, the time required to complete it being 24½ days. The steel beams for the floor and roof construction were taken from the adjacent floor framing originally constructed for a bicycle path. The work called into action the services of all the different mechanics in the division and consisted briefly of cutting out, removing and erecting in place the steel floor and roof construction, framing the wooden floors and roof; cutting retaining walls for beam seats, erection of platform railings, construction of stairways, installation of electric lighting system and the painting of the new work.

The Bedford Avenue station was opened to the public at 9:00 A. M. February 20th, but final operation by which the cars of all lines were stopped for passengers at this station was not commenced until Monday, February 24. About 4,000 local bridge tickets are sold daily and about 7,000 passengers per day use this platform from the New York surface lines.

During the following month the station was extended two bays eastward and now has a total length of 165 feet with about 50 per cent. of the area roofed over and with three stairways leading to the footwalk.

A contract was let on December 19th for the construction of outside platforms for the Bedford Avenue trolley station. The contract price was \$10,579.00. These platforms are to be located between the roadway and the surface car tracks and are intended to supplement the present center platform by accommodating passengers on the east bound Brooklyn lines or west bound Manhattan lines. Pending the completion of these platforms, a temporary shelter has been constructed by Department labor at Roebbling and South Fifth streets for passengers boarding the west bound Manhattan cars on the Plaza at this point.

A duplex, two-stage, motor-driven, 200 H. P., air compressor was furnished and installed in the Kent Avenue Yards and was started in service during the early part of the present year. The compressor house and all street service connections were completed by Department labor. The air line served by the compressor extends up the intermediate tower leg adjacent to the compressor house and is thence carried along the structure, where it will finally form a continuous line extending from the portal of the Manhattan subway station to Bedford Avenue, Brooklyn, with a total length between terminals on the structure of 6,537 feet and with outlets located approximately 200 feet apart. About 3,000 feet of the line is now in place on the structure, extending from anchorage to anchorage. The air supply is for use in routine structural repairs and for the work now being done by Department labor on the reinforcement of the main spans. A typical week's service is as follows: Hours worked, 44; holes drilled, 1,185; rivets driven, 1,307; kilowatts consumed, 2,010.

On Sunday, December 14th, the north roadway of the bridge was closed to vehicular traffic, to allow for the laying near the centre of the main span of a test section of under-flooring over which were to be laid equal test sections of various types of paving blocks. These new sections were planned to test shallow paving blocks laid on an intermediate plank deck bolted to the present flat deck channels in an endeavor to reinforce these underflooring channels without increasing the dead load on the structures. The present paving consists of treated wood blocks four inches in depth laid directly on the backs of longitudinal steel channels. These channels are 12 inches, 20.5 pounds, bolted together and laid flat with flanges downward and supported every 30 inches by 7-inch vertical channels spanning between the longitudinal girders of the floor framing. About 1,600 square yards of wood block paving was relaid during the year.

In connection with the proposed change in paving and underflooring on the roadways of this bridge and the Brooklyn Bridge, tests were made at the Kent Avenue Shops and on the structure and from these tables compiled of the relative weights, amount of absorption, after various periods of immersion, and fire resisting qualities of yellow pine and spruce blocks when treated with various preservative compounds.

Both approaches of this bridge are paved with Medina sandstone paving blocks. Under the extra heavy vehicular traffic conditions now existing these blocks wear down rapidly, requiring frequent renewal with the consequent delays to traffic while the repaving is being done. During a part of this year the blocks removed have been replaced with granite paving blocks, the old blocks, in turn, being used to pave around the trolley track loops in the Manhattan subway station. About 2,960 square yards of repaving was done during the year, 1,320 square yards being new granite blocks in place of Medina sandstone, 1,160 square yards of old granite blocks on the Plaza, 290 square yards of Medina sandstone on the approaches and 190 square yards in the subway station, as stated above.

Work on the temporary repaving of the south footwalk on the Brooklyn land span was completed on December 17th, and is now being carried on in a similar manner at the Manhattan end. The paving, originally laid in 1903, consisted of an asphalt surface on a cork concrete base laid on a corrugated steel underfloor supported by the longitudinal steel beams and channels of the footwalk framing. This paving is removed where necessary, one-half of the footwalk in width being temporarily blocked off, and replaced by transverse planking 2 inches thick, laid on plank sleepers.

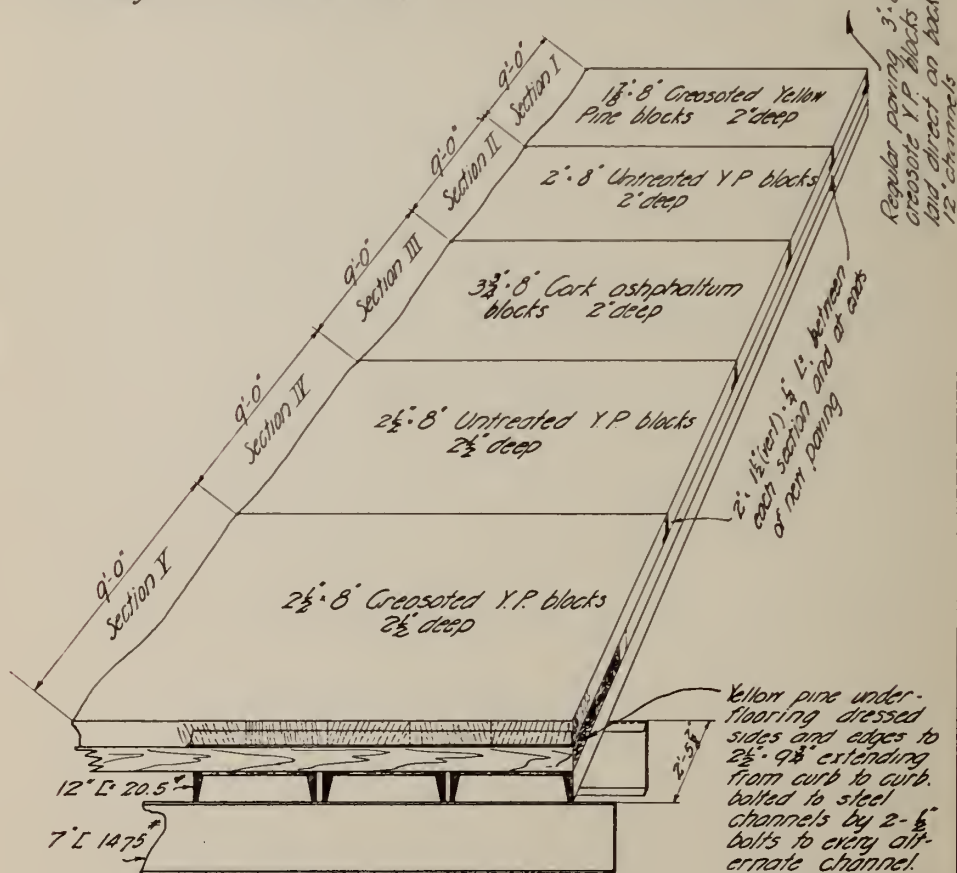
In connection with the widening of Roebling street, this Department has moved back the sidewalks surrounding the grass plots at the statue and at the two park spaces on the south side of the Plaza, to conform to the new street lines. The work involved rebuilding sewer basins, constructing new sidewalks and curbs and repaving the roadway. The sidewalk slabs taken up for the widening of the roadway were used again to pave the sidewalk space in front of the shops at Kent avenue. A new grass plot was prepared on the north side of the Plaza east of Roebling street and the two plots on the south side of the plaza west of Roebling street were laid out as park spaces with grass plots and hedges. Forty-six trees were planted according to a well-arranged plan about the walks on the Plaza. For this work the bluestone sidewalk flags were cut out in circular shape, cast-iron grilles placed about the bases and the trees protected by wrought-iron tree guards.

Electrical observations made during the early part of the year consisted of an inspection of the alterations and additions made during the fall of the preceding year to the negative feeder system in the Manhattan subway stations, and a series of instrument readings were obtained in such manner that a direct comparison could be made with those taken before any change had been made. A reduction in the amount of stray current of almost 97.8 per cent. was found. Long period readings

DEPT. OF BRIDGES — CITY OF NEW YORK
 WILLIAMSBURG BRIDGE
 EXPERIMENTAL ROADWAY PAVING

1913

New paving and underflooring laid as per sketch below for full width between curbs. Five sections of paving, each 9'-0" by 19'-11½". 45 feet of new underfloor plank laid across roadway from curb to curb.



Top of underdeck given coat of tar, untreated blocks immersed in water before laying. All joints filled with white beach sand.

Devised by E. A. BYRNE

EW.

taken with the Department's recording meters on the main structure indicate a small amount of stray current and plans are under way to reduce this by increasing the capacity of the cables connecting the track rails with the negative feeder cables.

A fire occurred on June 18th at Pier No. 58, between the legs of the main tower, Manhattan side. The fire was extinguished by the Fire Department with no damage to the structure.

The construction of the comfort station on the Plaza at Havemeyer and South 5th streets, under the jurisdiction of the Borough President, is nearing completion. The shelter house on the Plaza for bridge local service was completed by the operating company and the local loops enclosed in accordance with plans approved by this Department. The bridge local cars formerly operating from Loops 7 and 8 in the Manhattan Subway Station have been shifted to Loop 1 at the east end of the station. These changes were made to accommodate a traffic that has not only a large normal increase but has also been greatly augmented by the order of the Public Service Commission of December 1, 1912, changing the price of local bridge tickets from two to three for five cents. A great improvement in car operation and the method of handling this traffic has been manifest since the above changes were made.

Work has progressed on replacing the rails and defective rail joints and on other necessary repairs to the surface car tracks on the south side of the bridge. This work is done by the operating company in accordance with orders issued by this Department after a thorough inspection of these tracks. The guard rails along the elevated railroad tracks on the Manhattan Approach are being renewed under similar conditions. Extensive repairs have been made to the overhead trolley equipment on the south tracks, shuttle service being instituted on each track while the equipment over the other track was being repaired.

On the morning of March 3d the brakes on a three-car elevated railroad train failed to work on the down grade of the Manhattan Approach and the train ran into the subway terminal at high speed, crashing into the bumper blocks at the end of the track. About thirty persons were injured, but none seriously, and the track and train were considerably damaged.

On March 28th the New York Municipal Railway Corporation began the work of removing the platform and wall at the end of the north track in the Manhattan subway station in connection with the permit for the construction of a track for operating supply cars for construction work in the Centre Street Loop. A permit was also granted for the extension of the high tension cable terminating on the switchboard room at the east end of the station and used for supplying current for lighting the station. This cable is now used in connection with the operation of trains through the Centre Street Loop.

Regular passenger service on the elevated railroad extension across the bridge into the Centre Street Loop to Chambers street was inaugurated on the morning of August 4th. The first train entered the subway at the Manhattan subway station, Essex street, at 4.08 A. M., and reached Chambers street eight minutes later. In preparation for this service, the operating company completed a temporary wooden platform in the bridge subway station, adjoining the platform for the east-bound trains. Ticket booths and railings were installed and the platform is now in use, the use of the old centre platform being discontinued. The stairway at the west end of the station was removed and a temporary wooden stairway of one-half the width constructed, in order to allow for contemplated track changes. A pipe conduit line for switch and signal operation and a wooden conduit for signal wires were also put in by the company from the Manhattan Main Tower to the subway station entrance.

The total number of elevated railroad car round trips over the bridge was 410,678 as given in the accompanying tables. Approximately 65 per cent. of the total

number of cars during the week days cross the bridge in six hours of the twenty hours, namely, from 6.30 to 9.30 a. m. and from 4.30 to 7.30 p. m.

ELEVATED RAILROAD CAR SERVICE, SHOWING NUMBER OF TRIPS MADE BY EACH LINE.

Lines.	First. Quarter.	Second. Quarter.	Third Quarter.	Fourth Quarter.	Totals for Year.
Canarsie	83,790	87,252	87,279	80,783	339,104
Rockaway .....	.....	4,057	16,516	.....	20,573
Broadway .....	.....	.....	12,414	38,587	51,001
Totals, 1913	83,790	91,309	116,209	119,370	410,678
Totals, 1912	85,357	90,038	97,828	85,024	358,247
Reduction in 1913.....	1,557	.....	.....	.....	.....
Increase in 1913 .....	.....	1,271	18,381	34,346	52,431

The total number of surface car round trips over the bridge during the year was 1,618,275, as given in detail in the accompanying tables. The following delays occurred during the year:

Causes of Delay.	Total Number.	Total Time	
		Hrs.	Min.
From defective car equipment.....	94	8	30
From derailments	221	18	41
From trolley wire or conductor bar repairs.....	559	27	34
From collisions and accidents.....	36	2	19
From miscellaneous causes	461	59	46

—or a total delay in time of 116.8, giving an average per 1,000 cars of only 4.3 minutes for the entire year. This does not include delays or shuttle service for track repairs. The two tracks on the north side of the bridge are used by the New York Railways Company and Third Avenue Railway Company lines with terminal loops on the Brooklyn Plaza. The two tracks on the south side of the bridge are used by the Brooklyn Rapid Transit Co., Coney Island and Brooklyn Ry. Co., and Bridge Local line, with terminal loops in the subway station at Delancey and Essex streets, Manhattan.

SURFACE RAILWAY CAR SERVICE, SHOWING THE NUMBER OF TRIPS MADE BY EACH LINE.

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
Brooklyn Lines:					
Broadway	19,962	20,625	20,589	20,388	81,514
Nostrand Avenue	20,135	22,258	25,561	20,556	88,510
Reid Avenue	18,741	19,259	19,460	18,789	76,249
Hamburg Avenue	16,507	17,041	17,523	16,677	67,748
Ralph Avenue	29,019	29,094	29,683	29,662	117,458
Bushwick Avenue	19,996	21,089	21,171	19,128	81,384
Sumner Avenue	14,070	14,134	13,917	13,642	55,763
Tompkins Avenue	19,509	20,282	19,341	18,593	77,725

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
Brooklyn Lines:					
Grand Street	17,951	19,328	19,765	18,208	75,252
Wyckoff Avenue	4,762	5,326	5,749	4,904	20,741
Crosstown	371	535	508	495	1,909
Metropolitan Avenue ..	3,702	4,554	5,077	3,660	16,993
Franklin Avenue	20,427	22,298	24,321	20,936	87,982
Bridge Locals	51,131	55,902	54,592	55,257	216,882
Specials	61	54	157	88	360
Totals	256,344	271,779	277,414	260,933	1,066,470
Manhattan Lines:					
Fourteenth Street	53,914	54,529	52,742	53,296	214,481
Eighth Street	18,745	21,879	22,392	22,030	85,046
Fourth Avenue	19,878	20,759	20,500	23,164	84,301
Seventh Avenue	12,921	7,060	6,289	6,033	32,303
Grand Street	16,643	17,616	17,273	16,040	67,572
Post Office	16,724	17,592	17,197	16,589	68,102
Totals	138,825	139,435	136,393	137,152	551,805
Grand Total for 1913.....	395,169	411,214	413,807	398,085	1,618,275
Grand Total for 1912.....	394,204	421,259	418,308	404,247	1,638,018
Reduction for 1913.....	.....	10,045	4,501	6,162	19,743
Increase for 1913.....	965	.....	.....	.....	.....

STRENGTHENING OF THE MAIN SPAN OF THE WILLIAMSBURG BRIDGE

Plant

The building of the plant embraced the construction of the following:

A working platform 64 feet wide and 80 feet long, erected at the center of the main span on the top lateral system and overhead trusses, and contains 22,000 feet B. M. of lumber.

Engineer's field office on the working platform.

Two shelter houses for engines.

House 7 feet wide and 100 feet long, containing locker and wash room, temple and blacksmith shops, and store room for bolts, tools, etc.

Two cars 42 feet long, used for conveying material for the top chord.

About 6,000 feet of wooden rails were erected on the top chord, used as tracks for cars.

Construction

Of a total of 160 panels, the strengthening of 115 panels of the top chords were completed, or 2,300 linear feet of chord completed of a total of 3,200 linear feet.

Items of work were as follows:

36,597 rivets driven,

18,764 rivets cut out,

41,237 holes drilled.

3,500 feet (about) total thickness of metal drilled.

Percentage of work completed at the close of each quarter:

	Percentage.	Average Number of Riveters Employed.
First quarter	3.5	22
Second quarter	7.5	28
Third quarter	22.5	29
Fourth quarter	45.0	30

The above percentages are based on the items of work, and not on the weight of material to be erected.

During the first quarter most of the plant was constructed.

In the second quarter work was practically suspended one month, due to lack of funds.

In the third quarter the erection of the side plates was commenced.

The time required for reaming and fitting up a side plate after it has been in place has been reduced from two days to two hours.

During the last quarter an average of 225 rivets per day were driven by each gang of riveters, and less than one per cent. of these rivets were condemned by the inspector.

Judging the increase in speed in the amount of work performed in each quarter over its preceding one, and in view of the fact that in the last quarter 22½ per cent. of the total work was completed, it appears that the strengthening of the main span will be entirely completed not later than July 1, 1914. This does not take into account any excessive delay due to inclement weather or unforeseen difficulties that may arise on the strengthening of the bottom chords.

WILLIAMSBURG BRIDGE—WILLIAMSBURG PLAZA

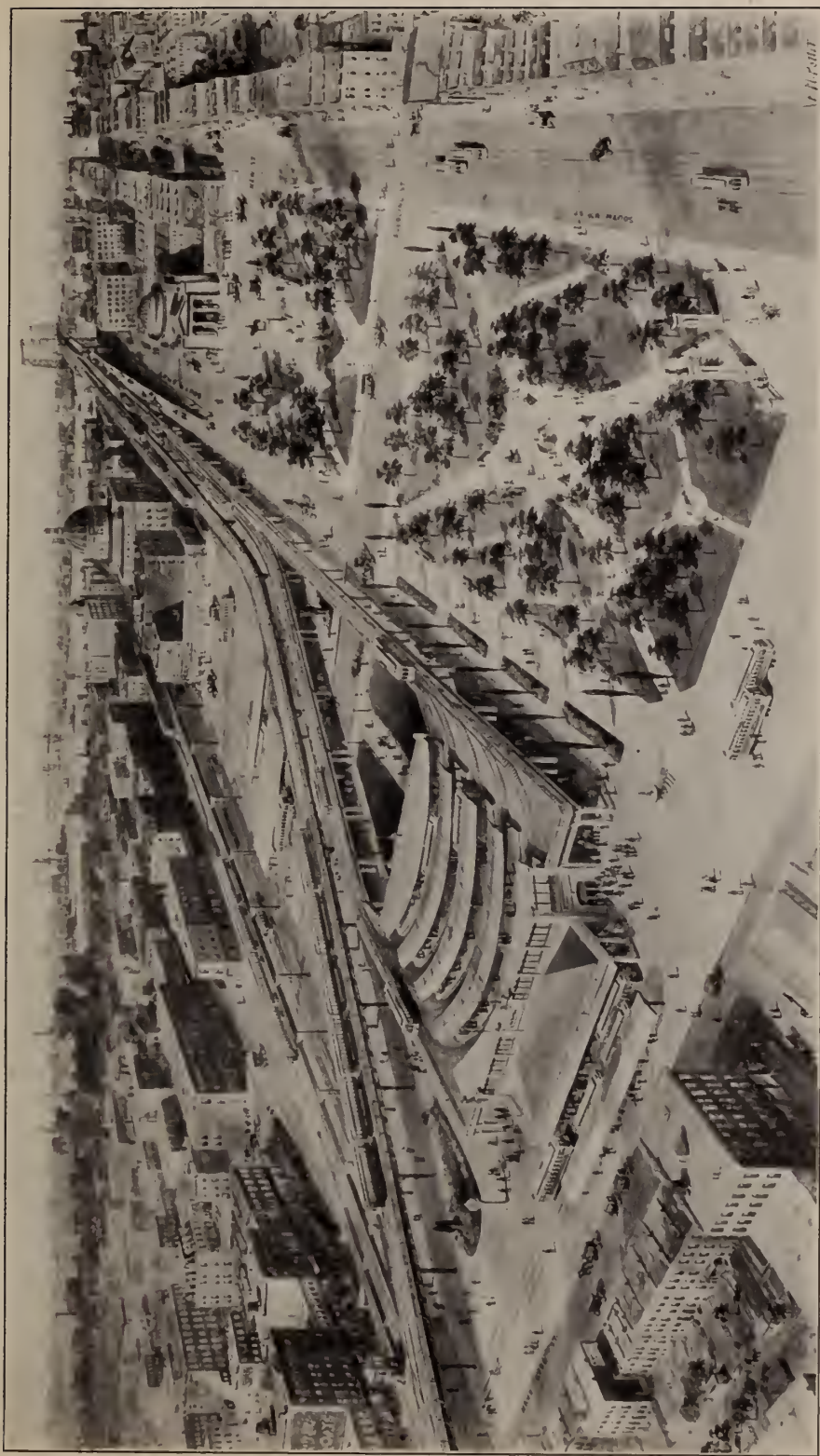
(Second Plan)

The accompanying plan, showing an alternate treatment for the Williamsburg Plaza of the Williamsburg Bridge, has been made by the Bridge Department in order to allow to allow Roebling street to cross the plaza without the danger attending the crossing of heavily loaded trolley tracks by vehicular traffic. In order to do this the lines of the Third Avenue and Metropolitan Street Railway lines, which occupy the tracks on the north side of the bridge, have been elevated over the plaza into a four-loop station on Havemeyer street near the corner of Broadway.

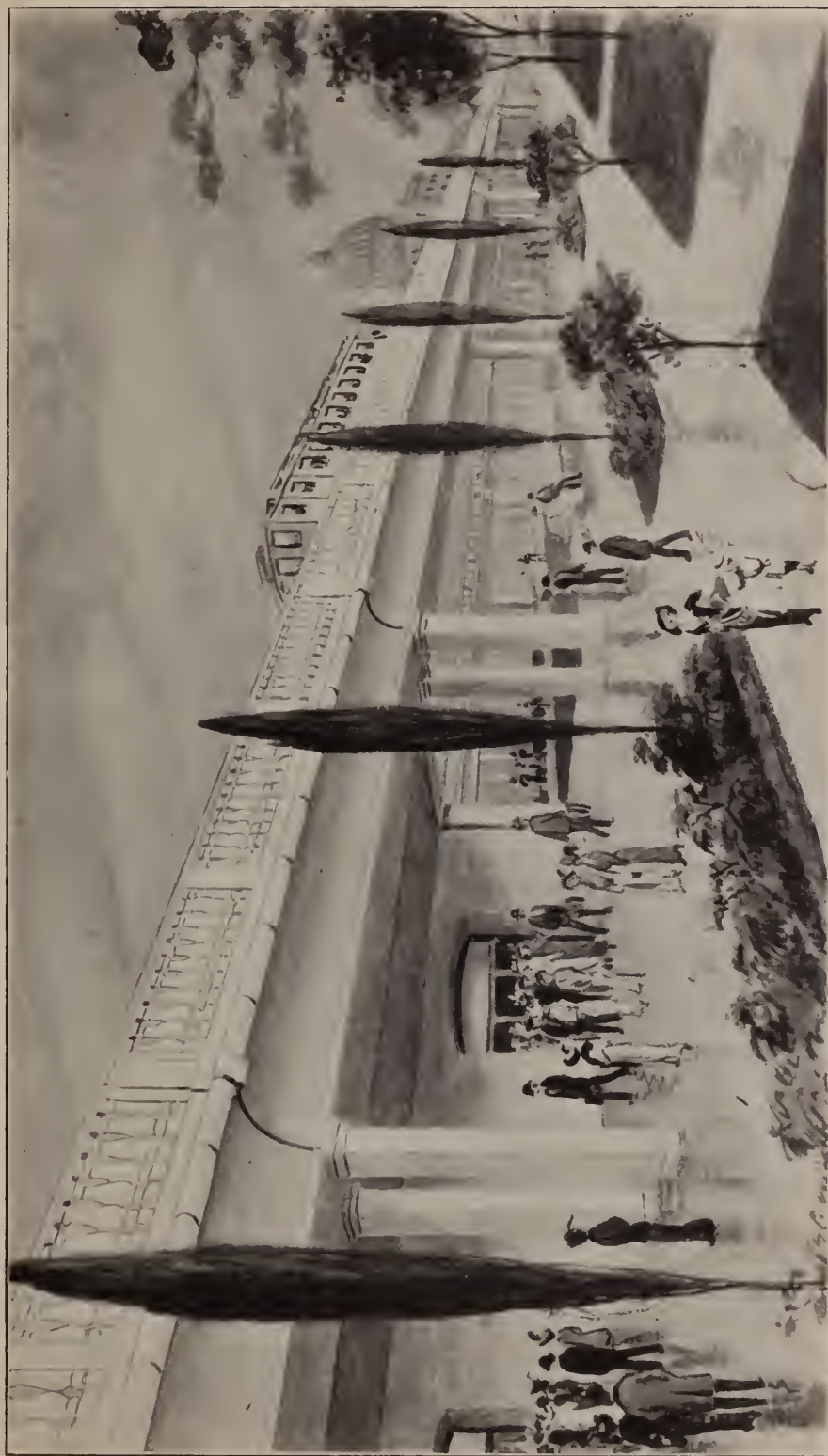
The new tracks begin far enough back from New street on the bridge approach to be taken out on a level over that street, and over Roebling street at a sufficient height to allow the vehicular travel to pass underneath at both streets.

The elevated structure is designed to be made of steel, covered with concrete. The design is new, an artistic treatment having been given it in order that it may have a pleasing appearance on the border of the park.

The cars on these elevated tracks enter the station on four loop tracks, with platforms so arranged that the cars unload on one platform and load from the opposite platform. People arriving will be unloaded on a platform, proceed to the stairways at the end of that platform, which lead down through the station and out to the park on both sides of the structure. Persons arriving at the station and desiring to take the cars, enter through doors and passways on Havemeyer street, or by a broad path up from Roebling street. On the Havemeyer street front cars operating through Brooklyn pass this terminal station. Here it is arranged that these cars will stop, and will load and unload directly in front of



77 WILLIAMSBURG BRIDGE—PROPOSED BROOKLYN APPROACH (REVISED). 1913.



WILLIAMSBURG BRIDGE—PROPOSED BROOKLYN APPROACH. 1913.

the proposed station, thus concentrating the trolley car travel and making it most convenient for transfer.

The Brooklyn cars, which have their terminus in the Delancey street station on the Manhattan side and which now occupy the two southerly tracks on the bridge, will leave the bridge approach eastbound at New street and join the Broadway tracks under the present elevated structure on Broadway. Westbound cars coming off Roebling street or Broadway enter the plaza just west of Roebling street and pass to the bridge approach parallel with the present elevated structure, crossing the plaza.

The bridge local cars are provided with a station on the plaza at the junction of Roebling street and Broadway, where tickets are taken up before entering the cars. The unloading of passengers is done directly into the plaza. The rest of the plaza is laid out as a park, with pathways, trees, shrubs, fountains, statues, etc., in marked contrast with the present layout.

Only as much plaza space is devoted to trolley traffic as is necessary, and an artistic treatment has been given to the track structure and station. Taken as a whole, this plan will give an impetus to improvement of surrounding property and will form a new civic center.

QUEENSBORO BRIDGE

Maintenance

The routine cleaning of the bridge, approaches, etc., comprises the daily sweeping and cleaning of 45,800 square yards of bridge roadway, 33,700 square yards of bridge promenades, 5,800 square yards in the Manhattan subway station, and 29,200 square yards of street areas including the plaza in Queens. The bridge forces have also to clean and maintain the offices at 305 East 60th street, the store rooms, quarters and shops under the Manhattan Approach, the elevators and stairs in the anchor piers, and the trolley shelter on the plaza in Queens. The care of the grass plots, flowers and shrubs in the park spaces on the plaza is also part of the routine maintenance. The lighting system is maintained by the companies furnishing electrical current under contract with the Department of Water Supply, Gas and Electricity.

During the year the "construction" painting was practically completed. The first coat of structure color was applied to the lower deck framing and the bottom chord truss members below the roadway floor level. The second or "final construction coat" was completed on the upper deck floor system and on all truss members above the roadway level from the anchor pier in Manhattan to bent 70 on the Queens Approach, a distance of about 5,500 feet. At the end of the year there remained only a small portion of the floor gratings along the car tracks, Queens Approach, to which the first coat has not been applied; and the following parts of the structure have not received the final coat; the under-floor and bottom chord truss members below the roadway level in 103 panels on the main bridge, total length 2,997 feet, and 90 panels on the approach in Queens, total length 2,236 feet; the interiors of five of the eight tower legs; all of the lattice railings outside the trolley tracks on the lower deck.

Other painting work during the year included the interior steel work over the timber arches, Manhattan Approach, priming fabricated steel in the shops, painting benches, shelter houses and similar small work.

At the end of the year, the construction painting being practically finished up the force of painters was reduced from 63 to 20.

Routine structural repairs and replacements during the year included alterations and repairs to the aprons at the expansion points; construction of landing platform at top of Manhattan anchor pier; safety tread renewals; construction

of grill doors for anchor pier entrances, and doors for openings in tower legs at the main piers, extension of footwalk railing, Manhattan Approach; pipe guard railings at subway trolley loops; and hand ropes over the struts between the top chords of the main trusses. Insulating bolts were put in on the trolley pans over the subway loops and repairs were made to the drainage system over the timbrel arches. The expansion panels in the railings at the center of each river span were repaired and the roadway joint at the subway portal was transformed from a movable to a fixed joint.

Extensive repairs have been made to the two elevators in the Queens anchor pier, rendered necessary by the extremely heavy duty to which these elevators have been subjected. These consisted of repairs to automatic switches, door switches, car control, brake bands, rotor of one motor, renewal of cables, thrust plate renewals, installation of new drum counterweight, and the shortening of one set of cables. All repair parts are now fabricated, as required, at the Brooklyn Bridge shops and work is now under way on duplicate parts of all mechanism for which renewals are required.

The elevator in the south shaft was opened to public use on October 23, 1912, and was kept continuously in service from 6 A. M. to 10 P. M. daily. On December 28, 1912, the north elevator was opened to public use and a schedule was adopted by which one elevator was in service daily from 6 A. M. to 10 P. M., as before, and was supplemented by the service of the other elevator from 6 to 10 A. M. and from 4 to 8 P. M. on each week day, and from noon to 2 P. M. on Saturdays. On October 18, 1913, the service was further extended by the running of one elevator from 10 P. M. to midnight.

These elevators have a rise of 118 feet, with three stops, and are constructed for a speed of 300 feet per minute with a live load of 2,500 pounds. The main bulk of this service is for the people from the district contiguous to Vernon avenue, using the surface car lines on the outer tracks which stop at the trolley platforms at the anchor pier. The following table shows the trips made and the passengers carried during corresponding months of 1912 and 1913. As high as 48 trips per half hour have been made and, in one day, in March, 5,344 persons were carried in sixteen hours. About 56 per cent. of the passengers are carried in four hours of the twenty-four, namely, from 6.30 to 8.30 A. M., and from 4.30 to 6.30 P. M.

	October.	November.	December.	Total.
1912 trips	5,922	24,900	25,720	56,542
1913 trips	40,528	41,444	36,222	118,194
1912 passengers	20,520	87,134	95,140	202,794
1913 passengers	121,350	113,569	100,751	335,670

Plans were completed and work has progressed during the year on the construction of a permanent steel runway for movable platforms under the deck of the viaduct from the anchor pier east to Bent 85, Queens approach, a total distance of 2,133 feet. The construction consists of five lines of longitudinal I-beams, 8-inch, 18-pound, spaced 20 feet centers and supported at intervals of 12 feet by double 6-inch channel hangers riveted to the webs of the lower deck stringers. On these I-beams are to be carried steel trolley hangers for suspending scaffolds to be used in routine inspection, painting and repairs. The plain material is bought, and all shop and field work is done by Department mechanics.

Pipe railings have been partially fabricated ready for erection on the south side of the subway station portal on each side of the east-bound surface car tracks as further protection for trolley car passengers at that point. Plans were pre-

pared and work has been started in the bridge shops on the construction of permanent ornamental metal gates for the archways between points 17 and 18, Manhattan Approach. The gates are to replace the present wooden ones, and will conform in design with the grilles in the adjacent arches.

Continuous repairs were made to the wood block pavement on the main bridge and Queens Approach. In addition to the great number of small patches that were repaved, as the wood blocks heaved from day to day, a complete section of roadway from Panel 9 to Panel 19, Queens Approach, was torn up, the concrete foundation repaired and resurfaced and the old blocks relaid, bottom side up. The above repairs were made to maintain roadway traffic safely with the least possible expenditure. This traffic has greatly increased, both in volume and in intensity of loads, during the past year.

To meet the conditions of the rapidly increasing traffic, three sections of experimental pavement were laid during the year. The first section extended from Panels 46 to 48, Queens Approach, an area of about 100 square yards, and the second section from Panels 39 to 43, main bridge, an area of about 320 square yards. The old wood blocks and concrete foundations were removed and the exposed buckle plate under floor was repainted; longitudinal timbers of 3-inch by 12-inch creosoted yellow pine were bolted directly to the floor stringers, 5 feet apart, and similar cross headers at intermediate points were bolted to the floor beams. The spaces between the timbers were filled with a concrete foundation and the top surface troweled to a "sidewalk finish" flush with the upper surface of the timber. On this composite foundation creosoted yellow pine paving blocks, 3-inch by 8-inch, and 3 inches deep, were laid directly without mortar bed or sand cushion.

The third experimental section was laid on the south half of the roadway from Panels 48 to 55, main bridge, an area of about 420 square yards. In general character it was similar to the other two excepting that the spacing timbers were 2½ inches thick and that steel angle dams were placed at each end to prevent creeping of the pavement. The experimental sections of pavement are standing up well under traffic.

The new shelter house at the end loops adjacent to Jackson avenue on the plaza in Queens was completed and opened to the public on June 7. Plans were prepared for using the two toll houses which, up to that time had been used for a shelter house on the plaza, for temporary shelter stations, to be located on the two footwalks of the Manhattan Approach, near 2d avenue. Arrangements were also made with the Commissioner of Public Works, Manhattan Borough, for furnishing the necessary attendants for these comfort stations when completed. These toll houses were accordingly moved over from the plaza, blocked up in their final location on the footwalks, sheathed and painted. Sewer connections have been made at 59th and 60th streets; the rough plumbing is in place in both houses, and the floor and base in the comfort station on the north footwalk have been completed.

The work of additional paving, curbs, railing, etc., required to complete the park space on the north side of the plaza adjacent to Skillman place was completed on May 24. The charge of this area was formally turned over to this Department on January 21, 1913.

The north footwalk on the structure was formally opened to the public on July 28, 1913. The opening of both footwalks was found necessary not because of the volume of travel but in order to allow passengers using the north elevator in the Queens anchor pier to reach their destination without crossing over the upper deck structure.

In accordance with the agreement entered into with the Bradley Contracting Company, for filling in the swamp land under the Queens Approach viaduct be-

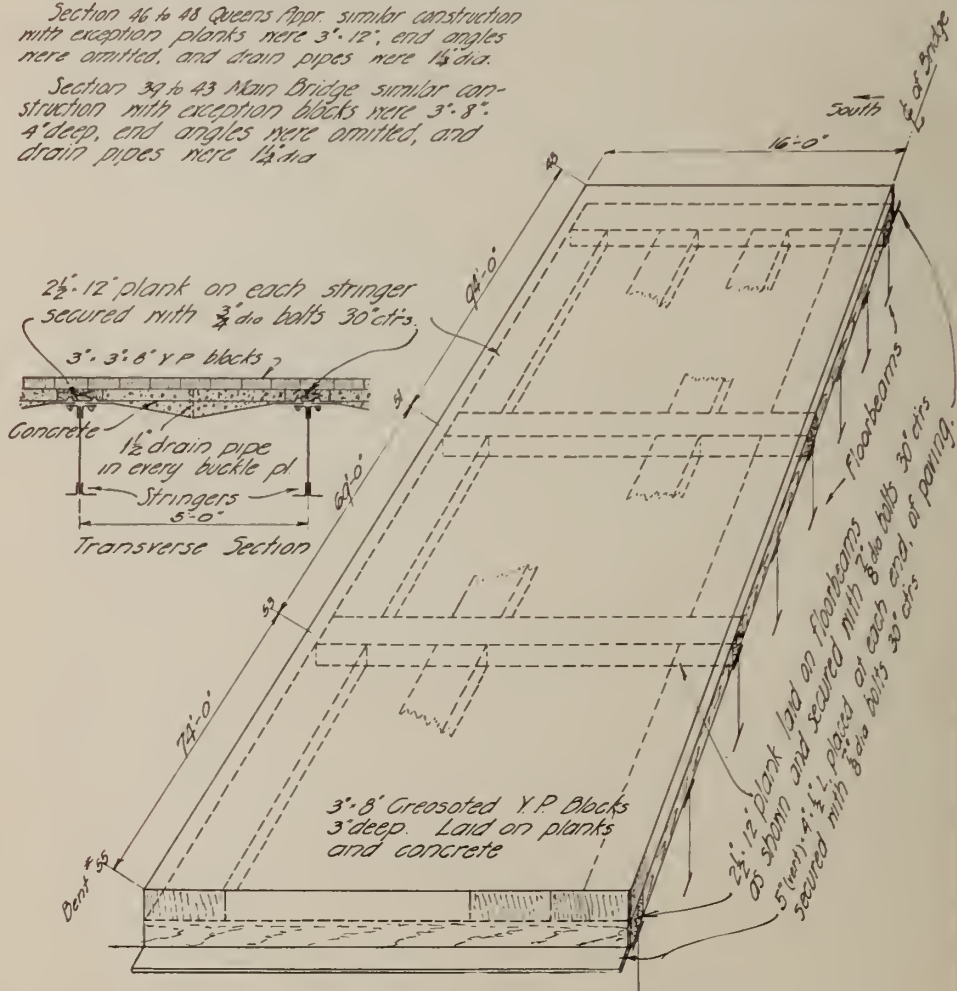
DEPT. OF BRIDGES — CITY OF NEW YORK
 QUEENSBORO BRIDGE
 EXPERIMENTAL ROADWAY PAVING

1913

New paving and foundation laid as per sketch below

Section 46 to 48 Queens Appr. similar construction with exception planks were 3" x 12" and angles were omitted, and drain pipes were 1 1/2" dia.

Section 39 to 43 Main Bridge similar construction with exception blocks were 3" x 8" 4" deep, and angles were omitted, and drain pipes were 1 1/2" dia.



Section 48 to 55 (south side) Main Bridge

Devised by E.A. BYRNE

EQ1



3" x 8" x 12" Blocks 3' deep
 3" x 3" x 12" Mark on each
 stringer, grooved for next hole

Dept. of Bridges
 City of New York
 1913

-- ROADWAY PAVING --

QUEENS HIGHWAY P. 13 46

1137-IV

E02

tween Ely avenue and Vernon avenue to the established street grades, that company deposited 178,000 cubic yards of fill during the present year.

The New York Edison Company and the New York and Queens Electric Light and Power Company have completed the installation of the two lines of 3½-inch pipe conduits across the structure along the north lower deck railing from Pier 1 to Bent 6, Queens Approach. Final splices were made on December 10 on two 450,000 c. m. cable, which had been installed in one of the conduit lines.

A permit has been issued to the operating company for the construction of a new cross-over between the two west-bound tracks on the Manhattan Approach. The present cross-over is located near the anchor pier; the new location, being nearer the subway loops, is intended to facilitate traffic.

In accordance with orders from this Department, the space used for storing cars and material in connection with bridge local operation has been vacated. All the old cars, repair material and the wooden enclosure have been removed. This has terminated the risk of fire from the material stored there, and has stopped the interference with car traffic resulting from the use of this space for a storage and lay-up track.

The Manhattan and Queens Traction Corporation, formerly operating only bridge local service, has extended the line across the Thompson avenue viaduct. A trial car was operated over the new line to the first Long Island Railroad train crossing, near Schroeder avenue, at 6.36 P. M., January 28. The first cars for public use were started on January 29; Loop 5 in the Manhattan subway station was assigned for the use of this line.

SURFACE RAILWAY CAR SERVICE, SHOWING NUMBER OF TRIPS MADE BY EACH LINE.

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total for Year.
N. Y. & Queens Co. Ry.					
Co. Lines:					
College Point	10,388	9,584	9,583	9,839	39,394
Dutch Kills	15,293	16,545	16,724	16,686	65,248
Steinway	18,684	24,355	27,958	19,695	90,692
Corona	15,715	18,397	18,399	17,436	69,947
Flushing	16,499	18,019	18,569	17,732	70,819
Totals	76,579	86,900	91,233	81,388	336,100
Manhattan & Queens Trac-					
tion Corporation	23,666	27,342	29,641	30,264	110,913
Third Avenue Bridge Co..	20,483	22,590	21,796	21,478	86,347
Grand Total for 1913....	120,728	136,832	142,670	133,130	533,360
Grand Total for 1912....	116,956	133,983	132,837	123,254	507,030
Increase for 1913.....	3,772	2,849	9,833	9,876	26,330

MANHATTAN APPROACH—QUEENSBORO BRIDGE

The accompanying sectional plan illustrates the inner working, so to speak, of the plan recently worked out by the Department of Bridges for a proposed Manhattan Approach to the Queensboro Bridge.

This plan, extending from Lexington avenue clear up on the bridge, illustrates how the various transportation lines which will form this new centre are co-related. In the extreme left-hand corner are shown the surface cars on Lexington avenue. Immediately under the street are the new Lexington avenue sub-

way local tracks which have a station here on Lexington avenue and outlets at 59th and 60th streets. Immediately under this station is shown the B. R. T. east-bound subway under 59th street which will have a station at Lexington avenue capable of taking long trains with outlets at Lexington and 3d avenues and escalators at both of these streets. Still under this, in the corner, is shown the express service tracks of the Lexington Avenue Subway. At the crossing of Lexington avenue and 59th street there will be virtually four decks carrying transportation.

One may follow the B. R. T. 59th street line almost across in the picture beginning at the station under Lexington avenue; it is shown crossing under the sub-trolley tracks in the middle picture and up on to the bridge. To the right in the middle foreground is shown the section of 3d avenue with the 3d avenue elevated tracks, the proposed new trolley station under the block bounded by 2d and 3d avenues and 59th and 60th streets, which this plan proposed by the Department of Bridges contemplates taking for transportation and approach purposes. In this sub-station is shown how it is proposed to operate the trolley cars underground with exits and entrances through a central house in the park, similar to the method used in Delancey street on the Manhattan Approach to the Williamsburg Bridge.

In the middle right hand is shown the 2d avenue surface cars and elevated tracks together with the 2d avenue elevated connection with the Queensboro Bridge, explained in the first picture of this layout. In order to operate the subway trains of the B. R. T. line on and off the bridge at the Manhattan end they will have to occupy the present location of the trolley tracks between the main trusses, and being so located in order to reach 59th and 60th streets, they destroy the present trolley station under the approach at 2d Avenue. To provide for a new trolley station the Department suggested a location at 3d avenue as shown on the plans. In order to accomplish this without grade crossings the trolley tracks were kept up on a lighter grade than the subway tracks and midway in the block were able to pass over the subway construction and enter a station just under the surface west of 3d avenue between 59th and 60th streets. As will be seen at a glance and as has been mentioned before, these lines of communication will form a traffic center of no small proportion.



PROPOSED MANHATTAN PLAZA
QUEENSBOROUGH BRIDGE

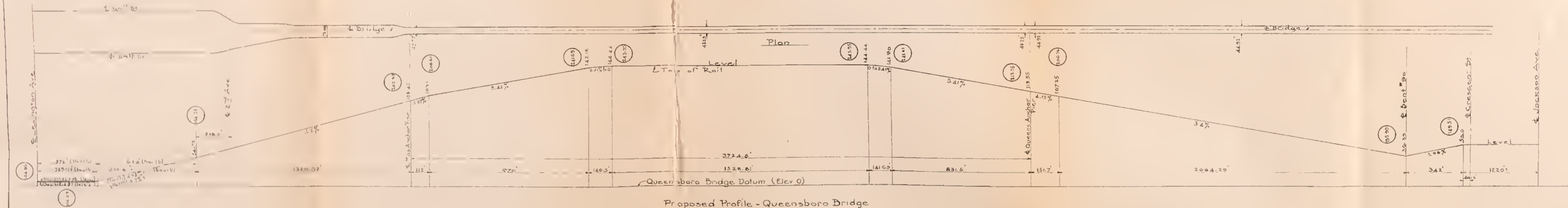
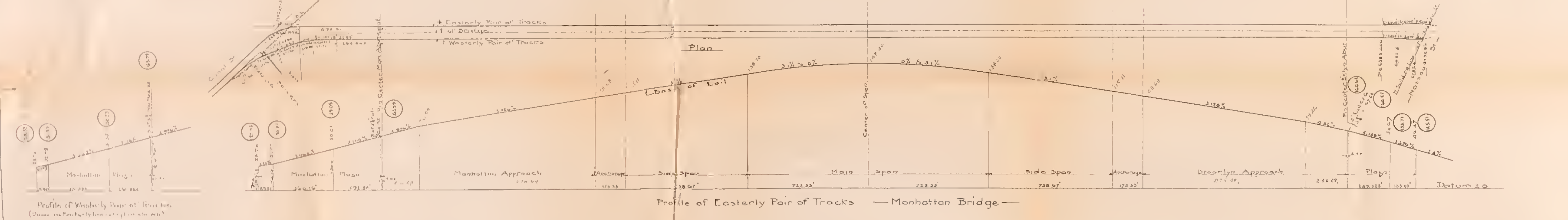
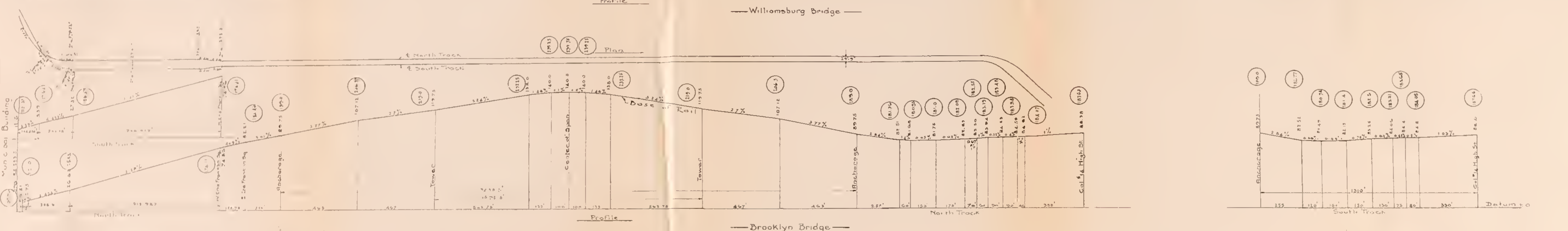
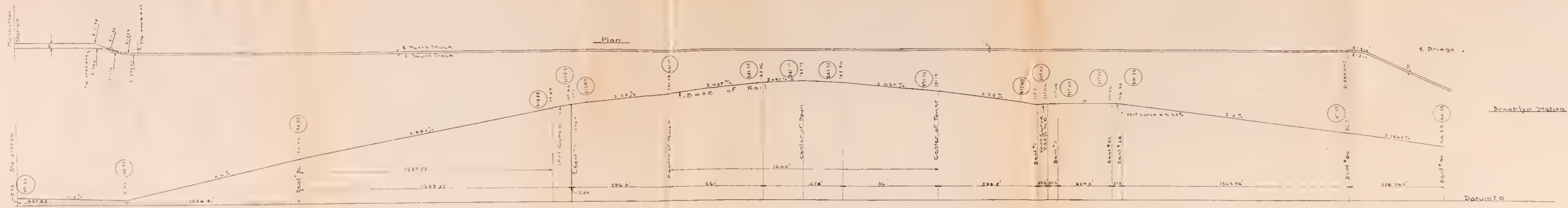
Arthur J. O'Keefe
Consulting Engineer

H. K. P. 1913

QUEENSBORO BRIDGE—PROPOSED MANHATTAN PLAZA. 1913.



QUEENSBORO BRIDGE—PROPOSED MANHATTAN APPROACH. 1913.



Public Service Commission Datum
 Williamsburg Bridge Datum
 Queensboro Bridge Datum
 Brooklyn Bridge Datum
 Manhattan Bridge Datum

Elevations shown thus
 are referred to P.S.C. Datum.

N.B.: Alignment and profile of tracks shown for
 Queensboro Bridge, tentative only

CITY OF NEW YORK
 DEPARTMENT OF BRIDGES
**ALIGNMENTS & PROFILES OF TRACKS
 FOR SUBWAY ROUTES ON EAST RIVER
 BRIDGES**

Scales { Vertical 1 in. = 50 ft
 Horizontal 1 in. = 250 ft

Approved Dec 10, 1912
Alexander Johnson
 Chief Engineer
William J. Johnson
 Commissioner

DIVISION OF DESIGN
 Drawn by A.L. Date 11/3/12
 Traced by A.L. " 11/9/12
 Checked by A.L. " 11/11/12
Donald W. Johnson
 Engineer of Design

Revised Dec 20, 1912
 R.C.S.



HARLEM RIVER DIVISION

HARLEM RIVER DIVISION

5. WILLIS AVENUE BRIDGE

At the beginning of the year a contract was in force which provided for the installation of an electrical operating equipment and the consequent abandonment of steam power. Very little was done on this contract in 1912. On July 31, 1913, the bridge was electrically operated for the first time. There was no interruption to traffic while the change from steam to electricity was being made and since the above date the new machinery and motors have operated satisfactorily. The new mechanism was installed under the direction of the Construction Division. The power for operating the bridge is supplied by the United Electric Light and Power Company and in addition there is a cable connection to the mains of New York Edison Company for a break-down service. The seats of the rest piers had to be cut down to meet the requirements of the new lifting and latching device. Most of this work was done by Department labor; the remainder under a Department order.

A new automatic system for oiling the bearings of the longitudinal shaft under the draw span and the worm gears at the ends of the draw was installed under a Department order and a platform was built by Department labor inside the drum to carry a pump of this system and give access to it.

In January one of the two inspection platforms at the ends of the draw span installed under the first-mentioned contract was struck at night by a boat while the bridge was in a partially opened position. These platforms are adjoining the rams which project below the general clearance line of the bridge and the accident served to show the danger of these being struck in a similar way. Accordingly a red danger light was installed near each of the four rams, and these lights are now lit at each night opening. Similar lights were installed at other bridges over the river as noted below.

One of the couplings on the main drive shaft broke under operation and was repaired. The main rack on the pivot pier showed some weakness and this was securely braced.

The large storage room under the Southern Boulevard Approach was torn down and the material which had been stored there was removed to the Madison Avenue Storeroom.

Extensive repairs were made to the railing on the Southern Boulevard Approach. At the beginning of the year a portion of the under deck of this bridge had been painted, and work was in progress. The remainder of the under deck and all of the above deck portion of the bridge were painted during the year.

With the removal of the boilers from the operating room it became necessary to provide some means of heating this place. In order to limit the space to be heated partitions were built about the operating machinery and a ceiling hung over the enclosed space. A stove was then installed. Two windows were cut in the outer partitions of the operating room to enable the engineman when in an operating position to see both up and down the river.

The Union Railway Company applied for a franchise to operate cars over this bridge and a report was prepared calling attention to the fact that it will be necessary to rebuild the floor system in part before cars can safely operate over it. The increase in the weight of loads which has followed the introduction of motor trucks is having its effect on our bridge floors and pavements. This is the case on the Willis Avenue Bridge, where the buckled plates were laid with the buckles upward and the plates not sufficiently supported for the loads of to-day. It was necessary to repair the asphalt pavement five times during the year—a total of 2,895 square yards relaid by contract and order. In the near future all the buckled plates in the

roadway should be inverted and be better supported, and a new pavement laid over them.

6. THIRD AVENUE BRIDGE

The contract for the installation of an electrical operating equipment at the Willis Avenue Bridge provided also for the installation of a similar equipment at the Third Avenue Bridge. Practically all of the work at the latter bridge was done in 1913. This too was accomplished without any interruption to traffic. The bridge was operated by electricity for the first time on June 23, 1913, and has operated satisfactorily since that date.

The power for operating is supplied by the New York Edison Company and in addition there is a cable connection to the mains of the United Electric Light and Power Company for a break-down service.

Danger lights were installed near the rams and partitions and a ceiling built in the operating room, as at Willis avenue.

The north approach to the bridge was repaved with a granite block pavement by contract. This work was begun in April and completed July 11th, at a cost of \$13,690.65. The asphalt pavement on the Draw Span and the Plaza was repaired on three occasions, a total of 342 square yards being relaid.

In July a Lehigh Valley tug attached to a float ran into the fender about the centre pier. A survey of the damage was made with a representative of that company and following this the company—through a contractor—made repairs at a cost of \$550.

A new comfort station was built by the President of the Borough of Manhattan on the Plaza at the southeast corner of 129th street and 3d avenue, on property under the jurisdiction of the Department of Bridges.

The granite block pavement on the south approach to this bridge is in poor condition and soon will have to be renewed.

7. MADISON AVENUE BRIDGE

The switchboard in the operating room burned out in October when the bridge was in a nearly closed position. A tug was hired to close the bridge and temporary repairs were made at once. Later the switchboard was permanently repaired and was moved to make it more accessible. A new rheostat was installed to replace an old one which had become defective.

Danger lights were installed as at Willis Avenue Bridge.

In February the fender about the centre pier was damaged by a tug boat belonging to the Lehigh Valley Railroad Company. A survey of the damage was made with a representative of the company and following this the company—through a contractor—made repairs at a cost of \$170.

Iron gates were installed at the entrances to the storeroom under the Bronx approach.

Under date of June 25, 1913, the Commissioner of Bridges granted a permit with certain restrictions to the Commissioner of the Department of Docks and Ferries to use the space along the Manhattan bulkhead between 138th and 139th streets and extending back a distance of 35 feet.

The worm gears operating the end lifting and centering device are considerably worn and soon will have to be removed. Also there are several leaks in the bridge floor over the shops and storeroom. These are being studied in the endeavor to stop the leaks.

7. MADISON AVENUE SHOPS AND STOREROOM

This division has been at a material disadvantage during the year, for want of light in the shops and storeroom and suitable power in the shops. In 1912 motors were purchased for use in the shops and the United Electric Light and Power Company brought their service to the building. In February, 1913, this Department submitted a tentative power plan to the Department of Water Supply, Gas and Electricity and a request was made to that Department to submit a plan for lighting. The power plan was approved in August and a plan for lighting was furnished this Department in October. The necessary materials were purchased and the Department employees proceeded with their installation as rapidly as the approvals of the Department of Water Supply, Gas and Electricity would permit. During the year the shafting and necessary supports for the principal motors were installed, the switchboards, necessary conduits and fittings and the lighting fixtures were purchased. The panel boards and light fixtures were about ready for delivery at the end of the year and it now seems probable that both light and power will be available early in 1914. In order to make the best use of the several machines in the shop, the portable air compressor in use in this division was connected to the shafting for the transmission of power and this in turn to the machines. With the exception of the paint mixer the machines most used were thus made available. The paint used in the division was mixed at the Queensboro Bridge.

Two inventories of stock in the Storeroom were made during the year, a room for the Electricians' quarters was set off by building up tile partitions, the interior of the shops was painted and a compartment was built under the Madison avenue approach for housing equipment. Window openings were cut in the side walls of this approach to give light to the large maintenance room and the ground surface was graded.

7. NEW OFFICE BUILDING AT MADISON AVENUE BRIDGE

This building was begun during the last quarter of the year. The frame is to be of steel, the walls of tile with a cement finish, and the roof of tar and gravel. The work is all being done by departmental labor and much of the material used is from stock in the Department.

At the end of the year the foundations had been built, the steel for the frame had been fabricated and most of it erected. The work was much delayed by the inclement weather.

8. 145TH STREET BRIDGE

The submarine power cable extending from the Bronx shore to the centre pier failed, and upon examination was found in such poor condition that it was replaced by a new one. The aprons at the Bronx end of the draw were shimmed up and refastened.

Repaired the timber bulkhead on the Manhattan side. The entire bridge was repainted. Danger lights were installed as at Willis Avenue Bridge.

Under date of June 24, 1913, the Commissioner of Bridges granted to the Commissioner of Docks and Ferries—with certain restrictions—the right to use that portion of the wharf under the jurisdiction of the Department of Bridges at the foot of 149th street, Harlem River, Borough of The Bronx, between the abutment of the 145th Street Bridge and the Harlem River. The fender about the centre pier of this bridge is in poor condition and soon will have to be repaired.

9. McCOMB'S DAM BRIDGE

Danger lights were installed as at Willis Avenue Bridge. Some repairs were made to the fender about the centre pier. The power cable burned out and was

repaired; while this was being done the bridge was operated by the break-down service, and consequently there was no interruption to traffic. The asphalt pavement was repaired three times by contract and order; a total of 804 square yards being relaid.

Under date of January 13, 1913, permission was granted to Rodgers & Hagerty, Inc., to fill in the bridge property under the Ogden avenue and Jerome avenue approaches lying within the area included between Exterior street and the New York Central Railroad property. Before depositing material under the approaches the steel columns carrying the viaduct of the Ogden avenue approach were incased in concrete. The approaches above mentioned originally crossed a salt marsh. This marsh at present is filled in and forms a large part of Macomb's Dam Park. The effect of filling in this marsh at various times has been to cause a very noticeable displacement of several piers and columns on the Bronx approach and of the superstructure carried by them. Steps will be taken during the ensuing year to make necessary corrections in the steel structure, particularly at the expansion joints. The criticism in reference to the buckled plates of Willis Avenue Bridge generally applies to this bridge also.

10. N. Y. & PUTMAN R. R. BRIDGE (FOOTWALKS)

Considerable work had been done on this bridge during the previous year and in consequence, this structure required little attention during 1913.

The Bridge Tenders' house was painted and a new gate was built on the approach to the bridge, at the top of stairs leading to property controlled by the Park Department and occupied by various boat clubs.

11. WASHINGTON BRIDGE

No important work was done on this structure during the past year, the principal work consisting of repairs to railings, roadway, lamp posts, sidewalk flagging and to the roadway pavement. Repairs to the asphalt roadway pavement were done by contract and consisted of 452 square yards.

Complaint was made of the inadequate street lighting on this structure. The arc lamps are in general placed about 275 feet apart, measured along the length of the bridge, and are alternately placed along the north and south railing of the bridge. The Department of Water Supply, Gas and Electricity has under consideration a new lighting layout, substituting Tungsten lamps for the present arc lamps.

12. UNIVERSITY HEIGHTS BRIDGE

The molding on fascia plates of the draw span were replaced where loose and in dangerous condition. A new coupling was put on the main vertical drive shaft, to replace a broken one, and the brakes controlling the draw were overhauled.

Repairs to the asphalt roadway pavement, amounting to 50 square yards, were made under contract.

The Manhattan bulkhead, which is leased by Handy Brothers, was improved by the addition during the year of a 4-inch timber sheathing along the face of the dock. The work was done under Departmental Order No. 1494.

13. SHIP CANAL BRIDGE

The axles of several balance wheels of the draw were found broken, and were immediately replaced by new ones. It was found that the balance wheels under the transverse loading girders were carrying an excessive load during the swinging of the

draw, and to permit of their proper adjustment the nuts controlling the adjustment device were cut down.

The cost of maintaining the asphalt pavement on this structure has been considerable in the past, owing to its shallow depth. After trying an experimental section, laid in April of 1913, the entire east roadway of this bridge was finally repaved with Topeka mixture carrying the wearing surface of asphalt. It has given good service up to the present. The total repairs to the asphalt pavement during the year amounted to 880 square yards.

During the year electrical grounds were installed at the ends of the draw span by the Third Avenue Railroad Company, in accordance with a permit from the Commissioner of Bridges dated August 11, 1913.

15. BROADWAY BRIDGE

No repairs of any kind were made in 1913. During the year, Spuyten Duyvil Creek, which this bridge crossed, was entirely filled in by private interests, from Kingsbridge avenue on the west to West Kingsbridge road on the southeast. The bridge is in very fair condition and will need but little in the way of repairs for some time. Since the bridge no longer crosses a stream, I would recommend that steps be taken toward turning it over to the proper City authorities.

16. KINGSBRIDGE

No repairs were made to this bridge except the replacing of some of the planks in the roadway in the early part of the year. The Spuyten Duyvil Creek to the west of the bridge had previously been filled, and during the summer private parties filled the creek on the easterly side. In October, when the Ship Canal Bridge was repaved in part, all the planking in the roadway of the Kingsbridge was removed and the broken concrete, etc., taken from the Ship Canal Bridge was filled in to make a solid roadway.

Under date of November 20, 1913, the Commissioner of Bridges turned over the jurisdiction of the street formerly occupied by the bridge to the Borough Presidents of Manhattan and The Bronx. Under date of November 24, 1913, the President of Borough of Bronx replied to the Commissioner of Bridges assuming "The jurisdiction over the portion of the street in question in the Borough of Bronx."

17. 135TH STREET BRIDGE

The roadway of this bridge was entirely replanked, and the trap doors in the deck over the tail pocket were enlarged. Some difficulty was experienced with the operating mechanism, which was repaired. A new circuit breaker was installed in the operating room and the power cable was replaced in part where it burned out. The Bridge Tenders' house was painted. Movable counterweights were placed on the lift span, so that it is now possible to raise or lower the bridge with approximately the same amount of power under any condition of weather, which was not possible before these counterweights were installed. The canal interests requested the City to install a winch at this bridge for the purpose of towing boats through the draw; a report on this matter was submitted under date of December 2, 1913.

18. WESTCHESTER AVENUE BRIDGE

The plank roadway was repaired, new rheostats were installed and minor electrical repairs were made. Under date of November 24, 1913, a Department order was issued to make certain alterations in the electrical equipment of this bridge for the sum of \$789. No field work was done on this order during the year.

19. UNIONPORT BRIDGE

The planking on the roadway was repaired from time to time and new longitudinal timbers were placed between the floor beams. The fixed span immediately east of the draw span was moved out of position by a passing boat; this was replaced without delay to traffic. The main pinion operating the draw span was broken and was replaced by a new one. The old storehouse was torn down and removed and the Bridge Tenders' house was painted. This bridge is a very old one and steps are being taken by the Department toward replacing it by a new structure.

20. PELHAM BRIDGE

Minor repairs were made to the deck planking, to the solenoid brake and to the electric wiring in the towers. The railings on the approaches and the lamp posts were painted. The roadway gates were shifted from their old locations at the abutments to points near the draw and an electric signalling system was installed between the gates and the operating room. A telephone was installed in one of the bridge houses.

21. CITY ISLAND BRIDGE

In October, 1912, the Commissioner of Bridges entered into an agreement with the City Island Railroad Company which provided that the railroad company should repave both approaches to this bridge the entire width from curb to curb with a gravel and oil macadam, and that the City should in turn repave the entire roadway on the steel structure with a wood block pavement. Incident to the repaving of the structure, it was necessary to remove all the old paving material including the concrete, invert the buckled plates and lay a new concrete base. Other changes had to be made in the expansion joint plates and in the roadway and sidewalk aprons at the ends of the draw.

At the beginning of the year 1913 about 70 per cent. of the buckled plate had been inverted, and about 40 per cent. of the new wood block pavement had been laid. Some of the necessary changes had also been made at the expansion joints. The railroad company had done nothing toward the repaving of the approaches.

During the year 1913 all the work contemplated as above was completed. The wood block pavement on the roadway of the bridge was finished in June and was opened to traffic on the 28th of that month. This work was carried on so that traffic over the bridge was not interfered with. Where the buckled plates were inverted they were thoroughly cleaned and painted, and at the same time the painters were painting other portions of the bridge, so that the entire structure and the bridge house were painted during the year with the exception of the portion which had been covered the previous year. The lampposts on the approaches were lifted to conform to the new curb set in 1912, and incident to this work some of the electric conduit was replaced by new material and the necessary re-wiring done. The Bridge Tenders' house was painted.

New bishop's crooks were made and attached to several of the lampposts where missing. A new submarine cable was laid to the pivot pier. New gates were made and installed on the roadway and sidewalks and repairs made to the handrail. All this work was done by departmental labor. The railroad company began work on the paving of the approaches in August and the last section of this paving was opened to traffic in November.

This bridge was closed to river traffic while alterations were under way. A satisfactory trial opening was made on September 11 and from that date was opened as occasion required. The Department of Water Supply, Gas and Electricity has made a request that this Department replace the present electrical

installation—with the exception of the recently installed submarine cable—for the purpose of installing Tungsten lamps for lighting.

22. EASTCHESTER BRIDGE (OLD)

Slight repairs were made to the plank roadway and new waling pieces were installed for the protection of the bottom chord. Under dates of October 25 and November 25, 1913, the Commissioner of Bridges directed the Alamo Construction Company to remove this bridge as per Department order dated February 19, 1912. This company began the work of removing the structure on December 23, 1913, under the direction of the Construction Division. On the same day the necessary barriers were erected for the safety of the public and signs were placed at conspicuous places directing the traffic to the temporary bridge.

22. EASTCHESTER BRIDGE (TEMPORARY)

During the summer the Highways Department of The Bronx regulated the grade of the Boston road, and where the trestle approach to the temporary bridge intersects the Boston road, the grade was raised about six feet. In order to meet the new conditions the trestle was raised for about two-thirds of the distance from the Boston road to the draw span. The several changes in this structure indicated on Drawing No. 28 and approved by the Commissioner of Bridges on June 4, 1912, with some later modifications, were also made. These consisted of cutting away a portion of the trestle and adding five feet to the short end of the draw, reinforcing the girders, and placing counterweight in the extension added. This work necessitated changes in the railings and wheel guards. Alternate pieces of underdecking were removed between the outer end of the draw and the pivot, the track on the center pier was leveled up, the rest wheels and the backstays were adjusted. The bridge house was painted and was moved to a location adjoining the trestle just east of the draw span.

All the above work was done by Department labor. This bridge was opened to traffic on December 23, 1913, the day the Alamo Construction Company began the removal of the old structure.

OFFICE BUILDING, NO. 428 EAST 133D STREET

Additional windows were cut in the outer walls of the first floor and the heating system was overhauled by Department labor. A lavatory and toilet were installed on the first floor and those on the second floor replaced by new ones. This work was done under a Department order.

NAVIGATION LIGHTS

The United States Government has called attention to the fact that nearly all the bridges in this Division are improperly or inadequately equipped with navigation lights. This Department is awaiting more detailed information before proceeding with the work.

TRAFFIC COUNT

On October 29 and 30 and on November 7 a count was taken of the traffic of all kinds over the principal bridges in the Division. Each bridge with the exception of the Broadway Bridge and Kingsbridge was covered and for a period of twenty-four hours.

DRAW OPENINGS—YEAR 1913.

Bridge.	No. of Openings.	Average Time per Opening, Minutes.	Remarks.
5. Willis Avenue	6,042	7.57	
6. Third Avenue	3,066	5.94	
7. Madison Avenue	2,591	4.72	
8. 145th Street	2,125	5.28	
9. Macomb's Dam	1,102	5.99	
10. N. Y. & Putnam R. R....	No count.		Operated by R. R. Co.
11. Washington	Fixed Span.		
12. University Heights	1,258	5.02	
13. Ship Canal	1,063	7.50	
15. Broadway	Fixed Span.		
16. Kingsbridge	Fixed Span.		Discontinued Nov. 20, 1913.
17. 135th Street	1,780	9.87	
18. Westchester Avenue	1,134	10.04	
19. Unionport	1,436	10.02	
20. Pelham	1,369	5.21	
21. City Island	41	25.40	Closed for repairs until Sept. 11, 1913.
22. Eastchester	729	9.97	

DIVISION
OF
BROOKLYN, QUEENS AND
RICHMOND

BROOKLYN, QUEENS AND RICHMOND BRIDGES, 1913

23. HAMILTON AVENUE BRIDGE

New hand-operating machinery has been constructed and erected. The shear locks were reversed to permit greater freedom of movement in opening or closing the bridge. Steel cantilever supports were constructed under the ends of the railway tracks on the lift; and the apron plates at the centre joint, raised to conform to the surface of the roadway. The bridge roadway was replanked and pier fender tops repaired. All the railings and gates were cleaned and repainted.

24. NINTH STREET BRIDGE

New hand-operating machinery has been constructed and erected. The apron plates were repaired. All the railings and gates were cleaned and repainted.

25. THIRD STREET BRIDGE

New hand-operating machinery has been constructed and erected. All the railings and gates were cleaned and repainted. The under deck planking of the bridge has been removed and replaced with new creosoted yellow pine plank, bolted to the steel floor beams, and to additional steel angle supports, and steel curbs constructed and erected, in preparation for laying a wearing surface of creosoted wood paving blocks, in place of planking in present use.

26. CARROLL STREET BRIDGE

The roadway surface and the sidewalks have been replankēd. A new board fence was built along the southwesterly property line. The worn asphalt surface on the easterly approach was taken up and replaced with new asphalt. All the railings and gates were cleaned and repainted.

27. UNION STREET BRIDGE

New hand-operating machinery has been constructed and erected. The electric motor operating the easterly lift span was taken down and re-erected in reverse position to conform to the requirements of the new machinery. A new rack section was substituted for broken section on northeasterly rocker support. All the railings and gates were cleaned and repainted.

28. WASHINGTON AVENUE BRIDGE

The sidewalk stringers and planking, were replaced with new material. The railings and posts were repaired and reinforced with new steel angles and channels. The operating machinery was repaired. The surface of the bridge pocket was graded and covered with gravel.

29. METROPOLITAN AVENUE BRIDGE

A concrete retaining wall and pipe railing, about 44 feet long, was built across the street end of the grass plot at the southwesterly corner of the bridge property, and a coping wall built and new grass plot formed at the northeasterly corner. The rim balance wheels and pedestal blocks, worn out in service, were cut out and replaced with new wheels and pedestal blocks. The hand-operating machinery was

repaired and fitted with a new steel bracket support. The gates were repaired and work begun on repainting the structure.

30. HARWAY AVENUE BRIDGE

Steel covers have been constructed and erected around the operating machinery to keep out the drifting sand. Work is in progress repairing the northerly rest pier masonry, erecting timber framing and sheathing on the channel side of the pier, and reinforcing the fender pile clusters to protect the pier from the wear and tear of navigation through the meagre waterway afforded by this type of bridge.

31. THIRD AVENUE BRIDGE

The railway companies, operating cars over the bridge laid down new rails and repaired the street surface between the tracks with five-inch granite blocks, laid in cement grout; and the worn asphalt on the remainder of the street surface over the bridge was taken up and the street repaired with granite block, in connection with the improvement and repairing of Third avenue.

32. OCEAN AVENUE BRIDGE

The old timber trusses and flooring over the channel span of the trestle has been removed, and a new steel bridge built in place, composed of 24-inch steel stringer beams, 9-inch floor beams and new yellow pine plank flooring. New railings were built, a long ramp approach constructed, and concrete sidewalk laid at the southerly end of the structure. Temporary repairs were made on trestle bents and piles, pending the construction of a new trestle.

33. SHELL ROAD BRIDGE

The abutment at the northerly end of this trestle bridge was rebuilt and the roadway planking repaired.

34. LEMON CREEK BRIDGE

The roadway planking was repaired, a new plank apron approach constructed, and the entire structure repainted. A new shelter house for the bridge tender is in process of construction.

35. FRESH KILLS BRIDGE

About 500 linear feet of the floor of the bridge approach at the northerly end of the structure has been reconstructed by adding five new rows of 5-inch by 12-inch yellow pine stringers, adzing off the rotten portion of the existing 3-inch by 15-inch stringers, and laying down an under-deck of planed 3-inch by 10-inch yellow pine plank. Upon this surface the old roadway plank has been laid as a wearing surface. This method of repairing has greatly increased the capacity of that part of the structure for heavy traffic, and reduced to a minimum the cost of renewal of the wearing surface. Pending the continuation of such repair work over the entire trestle, temporary repairs were made by adding about 300 new stringers and replacing the broken roadway plank with new plank. A new shelter house has been constructed and erected at the north end of the structure, to take the place of the old house at the south end of the bridge which was condemned and sold at public auction so that its site could be used to improve the roadways in that vicinity.

36. VERNON AVENUE BRIDGE

The steel structure, railings, machinery and shelter houses have been cleaned and repaired. The roadway surface of both lift spans of the bridge was replanked with new yellow pine planks. About 7,000 square feet of wood block pavement, in a condition beyond further repair, was taken up, the concrete base repaired, and new creosoted wood blocks laid on the northerly approach to the bridge. About 200 linear feet of broken concrete curb along the easterly side of the Queens Approach, and 170 linear feet on the westerly side of the Brooklyn Approach, was cut out and replaced with granite curb, and the concrete sidewalks repaired. The railway track joints were shimmed up and rebolted and forty-eight bond boxes fitted with new steel covers.

The easterly stairway connecting the bridge approach with Borden avenue has been moved nine feet south, and erected upon new concrete foundation, to permit the construction of a wider roadway on Borden avenue.

37. GREENPOINT AVENUE BRIDGE

New steel rack sections were laid in place of broken cast-iron rack section and broken rack pinion replaced by a new steel pinion. The railway companies using the bridge replanked the roadway surface with new material. The roof on bridge tender's house was renewed with tar and gravel roofing. The entire bridge structure has been shipped, cleaned and repainted.

38. MEEKER AVENUE BRIDGE

The sidewalks were reconstructed and replanked with new material. The entire structure of the bridge was chipped, cleaned and repainted. New pinion shaft and pinion erected in place of defective parts. One of the lower chords of the bridge, which was buckled by collision with a vessel, was straightened and reinforced with additional steel channel and cover plates.

39. GRAND STREET BRIDGE

A new retaining wall was built along the northeasterly property line, the sidewalk filled up and covered with grass sod, and an ornamental steel railing erected along the top of the wall. The center lock operating machinery and the electric equipment were repaired. Steel block supports were built under the ends of the railway tracks on the bridge, and the wearing plates on the ends of the bridge strengthened and secured in place. A new electric motor, switchboard and appurtenances have been procured and improved operating machinery ordered, to provide operating mechanism that will be adequate for the service required by this bridge. The entire structure has been repainted.

40. METROPOLITAN AVENUE BRIDGE (FIXED TRESTLE)

The railway companies operating over this trestle consented to furnish material and to fill up the creek over which the structure was built; a timber culvert to care for the drainage was constructed, the fill completed, the surface of the street paved, and that portion of the highway thus formed turned over on July 25, 1913, to the care of the Bureau of Highways in the Boroughs of Brooklyn and Queens. The Secretary of War approved on July 11, 1911, the request of the Board of Estimate and Apportionment for closing that branch of Newtown Creek and establishing a bulkhead line along the northerly line of Metropolitan avenue.

41. BORDEN AVENUE BRIDGE

New rails were laid in the track for the easterly set of trucks carrying the bridge, to replace rails that had split. The bridge was shored up and one of a set of trucks under the structure taken out, and the four wheels which were split and broken, replaced by new and heavier wheels and axles. Similar repairs are in progress on the other trucks under the bridge.

44. LITTLE NECK BRIDGE

The abutments have been repaired and the approaches replanked, to conform to the new pavement laid on the avenue, during the summer.

42. FLUSHING BRIDGE

The roadway was replanked with new material. Broken concrete curbs and sidewalks, at the corners of the bridge, on each approach, were cut out and replaced with new granite curb and concrete sidewalk. An iron pipe railing was constructed and erected along the northerly side of the east approach, to take the place of a wooden railing which was in poor condition. A new electric switch was installed and the electric power cables repaired to replace the damage done by lightning.

43. STRONG'S CAUSEWAY BRIDGE

Repairing operating machinery, erected new guard chains on ends of bridge, and repaired planking on the approaches.

45. HUNTERS POINT AVENUE BRIDGE

In connection with the building of a sewer in Hunters Point Avenue, the timber platform of the easterly abutment was changed and a sewer outlet constructed in conformity with a plan submitted by the President of the Borough of Queens, and approved by this Department.

OPENINGS FOR YEAR 1913.

No.	Name.	Number of Boats.	Number of Openings.	Times Open.		Boats Passing Underneath Bridge.
				Hrs.	Min.	
23	Hamilton Avenue	14,902	6,957	297	04	10,761
24	Ninth Street	25,845	11,806	459	44	2,292
25	Third Street	11,534	5,115	271	09	1,185
26	Carroll Street	7,575	3,951	242	08	54
27	Union Street	5,895	2,409	139	08	1,053
28	Washington Avenue	3,702	3,701	185	04	.....
29	Metropolitan Avenue	16,096	8,652	577	28	.....
30	Harway Avenue	1,153	608	61	29	.....
31	Third Avenue.....	Fixed span.				
32	Ocean Avenue.....	Fixed trestle.				
33	Shell Road.....	Fixed trestle.				
34	Lemon Creek	177	156	35	45	.....
35	Fresh Kills.....	Only trial openings.				
36	Vernon Avenue	51,367	17,907	1,407	39	48,903
37	Greenpoint Avenue	49,914	20,628	1,275	21	.....
38	Meeker Avenue	30,766	15,004	1,014	24	.....
39	Grand Street	5,212	3,419	338	33	.....
40	Metropolitan Avenue.....	Fixed trestle, eliminated July 25, 1914.				
41	Borden Avenue	2,693	1,708	151	45	8
42	Flushing Bridge	4,560	1,723	174	23	.....
43	Strong's Causeway	21	7	2	00	.....
44	Little Neck	74	78	18	04	.....
45	Hunters Point Avenue.....	2,539	1,591	144	20	.....

DIVISION OF DESIGN

EAST RIVER DIVISION

1. BROOKLYN BRIDGE

Manhattan Subway Connection

Contractors' shop drawings were checked and the work in the field was closely followed. Because the Rose street arch was cut in several places by the Subway, a special investigation of the strength of the remaining arch sections was made.

Shops and Buildings

The architects' plans were computed and checked, and changes made in the design to make the building of steel and reinforced concrete instead of reinforced concrete. The plans and specifications were corrected and prepared for advertising.

Reconstruction of Manhattan Terminal

Preliminary studies were made of the proposed terminal and particularly in relation to constructing the terminal while maintaining traffic.

Reconstruction of Brooklyn Terminal

Preliminary studies were made of the proposed reconstruction of the Brooklyn Terminal and the removal of elevated lines from Fulton street below City Hall.

Approximate estimates of cost were prepared.

Franklin Square Span

An investigation of the strength of the Franklin Square Span is being made, the work proceeding intermittently when more pressing work is not in progress.

2. MANHATTAN BRIDGE

Manhattan Plaza

Contractors' shop drawings for steel and masonry were checked, this work being now nearly completed.

Brooklyn Plaza

The contract plans and specifications were completed, and bids were received on May 22d. Since that time the greater part of the contractors' shop drawings for steel and masonry have been checked.

Equipment of Upper Deck Tracks

Contract plans and specifications were made, and bids were received on December 4th.

Painting Platforms

Details were made and nearly completed for trailers to the painting platforms, so that an entire panel could be covered at one time.

3. WILLIAMSBURG BRIDGE

Strengthening End Spans

Schedules showing the method of procedure for the work in the field were prepared. Details were made for a machine to be used in boring pin holes at Panel Point 29 and the construction and tests of the machine were closely followed. Much time and attention has been given to this work.

Strengthening Main Span

The work in the field has received due attention.

Changes in Manhattan Station and Bridge Structure

Studies were made of the changes necessary to operate the proposed 67 feet by 10 feet subway cars over the bridge.

4. QUEENSBORO BRIDGE

Elevators to Blackwells Island

Contract plans and specifications are nearly completed and ready for submission to the Board of Estimate and Apportionment. Work was commenced on the estimate of quantities.

Study of Subway and Elevated Traffic

Studies were made of the spacing, speed and signaling of trains for the operation of subway and elevated railroad traffic.

Changes in Structure for Subway and Elevated Traffic

Preliminary studies were made of the changes in the Queens Approach, necessary for the arrangement of tracks to connect with the Queens Plaza Station as proposed by the Public Service Commission.

HARLEM RIVER DIVISION

(6) THIRD AND (5) WILLIS AVENUE BRIDGES

Electrical Equipment

Contractors' shop drawings were checked and the work in the field closely followed. This contract is now completed.

Details were designed for an automatic oiling system.

BRONX DIVISION

19. UNIONPORT BRIDGE

Contract plans and specifications for a temporary bridge to replace the existing one during construction of the new bridge are in course of preparation. Studies are being made of the new bridge.

22. EASTCHESTER BRIDGE

Plans were made for alterations and additions to the existing temporary bridge.

BROOKLYN DIVISION

39. GRAND STREET BRIDGE

Designs for duplicate machinery are in course of preparation.

GENERAL

MUNICIPAL BUILDING

A survey was made of the office equipment of every department which is to occupy the Municipal Building, and plans and specifications were made for new steel equipment to replace that which was found to be unfit for use.

D I V I S I O N
O F
C O N S T R U C T I O N

DIVISION OF CONSTRUCTION

2. MANHATTAN BRIDGE

Manhattan Plaza

Contract for the improvement of the Manhattan Plaza let to Wm. P. Seaver.

Contract certified February 3, 1913.

Work commenced February 19, 1913.

Vehicular traffic on Canal and Chrystie streets, from Forsythe street to Bowery and from Hester to Canal streets, discontinued on March 17, 1913.

Temporary roadway parallel to Canal street on Bridge Department property opened for vehicular traffic March 17, 1913.

Car service on the Dry Dock, East Broadway and Battery R. R. Co. was discontinued between Forsythe street and Bowery on March 17, 1913.

The following work was accomplished during the past year :

Subsurface work—Sewers and water mains on Canal street.

Canal street grade raised to accommodate the grade of new subway in Canal street.

Pavement restored on Canal street from Forsythe street to Chrystie street, between north curb and south rail of south track.

Pavement in Chrystie street restored from Canal street to a point 300 feet north.

Subway connecting east side of bridge, lower level is completed as for footings, sidewalls and roof from the Bowery end to the south side of arch foundation, subway retaining walls from portal to abutment about 70 per cent. finished.

Exterior retaining walls—First shipment of granite received September 26, 1913.

Concrete base and granite masonry finished from rear of abutment to a point about 200 feet north, to underside of balustrade.

Colonnades—Concrete foundations for colonnades are finished up to granite line.

First shipment of granite for colonnades received December 24, 1913.

On December 31, 1913, the Contractor had consumed 55 per cent. of contract time and finished about 40 per cent. of contract.

Brooklyn Plaza

Contract for the improvement of the Brooklyn Plaza let to the North Eastern Construction Company.

Contract certified June 30, 1913.

Work commenced July 8, 1913.

Exterior Retaining Walls—East Plaza finished up to underside of granite.

West Plaza concrete foundation in place from rear of abutment along Jay street to point opposite High street.

Conduit Electric Track retaining wall finished up to underside of granite.

Easterly Subway—Retaining walls finished from abutment to portal up to underside of granite coping. Subway from portal to Nassau street finished as for floor, footings and sidewalls. The roof is finished from portal to a point about 110 feet north of Nassau street.

Pylons—Easterly Pylon concrete foundation finished.

Westerly Pylon concrete foundation about 40 per cent. finished.

Sewerage system about 70 per cent. finished.

Pavement—A small amount of permanent pavement was laid at intersection of Nassau street and roadway to bridge.

Granite Masonry—First shipment of granite received December 30, 1913.

In addition to the contracts on Manhattan Bridge, the following work was performed by the Engineering Corps connected with this office.

Surveys for Vernon Avenue Bridge.

Surveys for Washington Avenue Bridge.

Surveys for settlement and horizontal movement of anchorages at Manhattan Bridge and Williamsburg Bridge.

On December 31, 1913, the Contractor had consumed 36 per cent. of contract time and finished 21 per cent. of contract.

3. WILLIAMSBURG BRIDGE

Strengthening End Spans

Contract let to Snare & Triest.

Contract certified June 10, 1911.

During the year the following work was accomplished:

Diagonal reinforcement from 5 to 9 panel points also from 21 to 24 on both Manhattan and Brooklyn ends of bridge.

Erected new posts at panel points 10, 18, 20 and 21, north and south trusses, Manhattan and Brooklyn ends.

Erected pins at panel points 10, 18 and 20, north and south trusses, Manhattan.

Top chord reinforcement panel points 23 to 29, Manhattan.

Erected diagonal members U29-L30, north and south sides, Manhattan and Brooklyn ends.

Erected portal struts, Manhattan and Brooklyn.

At the close of the year the contractor consumed 605 days and finished about 99 per cent. of work.

4. QUEENSBORO BRIDGE

"For the Construction of the Elevators, Stairs, Drainage, Ornamental and Electrical work for the Anchor Piers of the Queensboro Bridge, over the East River between the Boroughs of Manhattan and Queens."

Contractors, The Chas. Meads & Co. Contract dated January 25, 1911. Work began, February 6, 1911. Work completed, January 21, 1913. About 15 per cent. of this work was done in 1912.

"Constructing a Shelter House on the Plaza of the Queensboro Bridge." Contractors, Kelley & Kelly, Inc. Contract dated November 13, 1912. Work began, November 27, 1912. Work completed, June 14, 1913. About 9 per cent. of this work was done in 1912.

HARLEM RIVER BRIDGES

"For the Electrical Equipment of the Third Avenue and Willis Avenue Bridges over the Harlem River."

Contractors, The Snare & Triest Co. Contract dated July 5, 1912. Work began, July 17, 1912. Work completed, October 28, 1913. About 15 per cent. of this work was done in 1912.

BOROUGH OF THE BRONX

"Bridge to replace Eastchester Bridge over Hutchinson River." Commissioner's Order "For Removing old Bridge and Center Pier over Hutchinson River."

Contractor, Alamo Construction Co. Order dated February 19, 1912. Work began December 23, 1913. Work now in progress.

MUNICIPAL BUILDING, 1913

During the year the work under the existing contracts for construction was vigorously prosecuted, so that sixteen floors in the building were practically ready for occupancy at the end of the year.



MUNICIPAL BUILDING FROM THE WEST, LOOKING EAST ALONG CHAMBERS STREET. 1913.



MUNICIPAL BUILDING FROM THE EAST, LOOKING WEST ALONG CHAMBERS STREET. 1913.



MUNICIPAL BUILDING FROM THE SOUTHWEST, CITY HALL IN FOREGROUND,
COURT HOUSE BEHIND CITY HALL. 1913.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
RAPID TRANSIT CONNECTIONS
IN THE VICINITY OF
THE MUNICIPAL BUILDING

— Subway
- - - Proposed Subway
... Elevated

0 100 200 300 400 500 600 700 800 900 1000

Dec 1913

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The work under the contract with Thompson-Starrett Company for the completion of the substructure, the erection of the superstructure, and the installation of the plant, was substantially completed and a hundred per cent. certificate for payment was issued under the date of February 28. The sum of \$106,460.85 was retained on account of the work to be done in spaces occupied by hod hoists, which it was not deemed advisable to remove until the work under other construction contracts had been further advanced. By the end of the year 86 per cent. of the suspended work was completed.

On the contract with the Thompson-Starrett Company for the interior finish of the building, the work was advanced to 78 per cent. complete. Robt. Wetherill & Co. practically advanced to completion the work under the contract for the installation of elevators, excepting the adjustments and the final tests, to 94 per cent. complete. Henry E. Fox completed all work to be done under the contract for laying and relaying water and gas mains and grading streets in the vicinity of the building, with the exception of certain work which was done by the contractor of the Public Service Commission for Center Street Loop, which matter is now being adjusted.

On June 13 a contract was entered into with Abraham & Straus for furnishing and installing the window shades. During the year the shades were erected on the 8th, 11th, 12th, 14th, 15th and 17th to 22d floors, inclusive, which work amounts to 45 per cent. of the total required. A contract was also executed on October 9 with the Edward Schroeder Lamp Works for furnishing and installing the lighting fixtures. All of the working drawings under this contract had been submitted to the Department of Water Supply, Gas and Electricity and are now awaiting approval.

By resolution on January 23, 1913, the Board of Estimate and Apportionment returned to the Commissioner the plans and specifications prepared by the architects for steel desks, tables and lockers, and directed that they submit for approval of that Board, forms of contract, specifications and plans and estimates of cost for lockers, shelving and filing devices, only.

On July 26, 1913, the plans and specifications for lockers, shelving and filing equipment, as prepared by the Department of Bridges, were submitted to the Board of Estimate and Apportionment for Approval. The plans and specifications were based upon retaining such steel and wooden equipment as was in good serviceable condition and replacing all other equipment with new steel furniture.

Under date of November 20, 1913, a contract was entered into with the Art Metal Construction Co. for furnishing and installing metal railings, screens, counters, etc., in the Municipal Building. The detailed working drawings are being submitted for approval.

The following departments began occupying their quarters in the Municipal Building on the dates set opposite the same:

8th floor—Headquarters Division, National Guard.....	November 25th.
8th floor—Examining Board of Plumbers.....	November 26th.
8th floor—Public Recreation Commission	December 15th.
12th floor—Commissioner of Accounts	November 10th.
12th floor—Department of Street Cleaning.....	December 4th.
14th floor—Municipal Civil Service Commission.....	November 15th.
17th floor—President of the Borough of Manhattan.....	December 31st.
17th floor—New York Sewer Plan Commission.....	December 25th.
18th floor—Department of Bridges.....	March 15th.
18th floor—Board of Elections.....	December 15th.
19th floor—Tenement House Department.....	November 24th.
20th and 21st floors—General Offices, President, Borough of Man-	
hattan	October 9th.
22d floor—Board of Water Supply.....	November 15th.

The President of the Borough of Manhattan and the New York Sewer Plan Commission are temporarily occupying the space which has been assigned to the Law Department.

Beside the foregoing floors, the 6th, 7th, 9th, 10th, 11th, 12th, 15th and 16th floors are also ready for occupancy.

PHOTOGRAPHIC WORK

Outside and Indoor Exposures made of various subjects.....	776
Velox Prints for Headquarters.....	1,326
Blue Prints for filing at resident Engineer's office.....	1,359

D I V I S I O N
O F
S H O P S A N D S T O R E S

DIVISION OF SHOPS AND STORES

At the first of the year the Cement Testing Laboratory was transferred from the Division of Construction to this Division. The laboratory is well equipped for making the usual physical tests of cement as required by the Department specifications, and all cement presented by contractors has been promptly tested and reported on.

Cement for current use has been tested during the year to an aggregate amount of 54,465 barrels and many long time tests begun in previous years have been continued. No changes of any consequence have been made in the well devised system of sampling, testing and recording results but a mechanical improvement has been made by slightly altering the form of the briquet-holding jaws of the tensile strength machines, in accordance with the recommendations of the Committee on Cement Testing of the American Society for Testing Materials, with the result that much more uniform results in tensile strength testing have been obtained.

The surplus goods which had accumulated in the Division store houses during many years have been brought to Central Stores, so far as there is room to care for them, leaving, except for lumber and paint materials bought by contract, steel and similar heavy supplies, only a three months' supply of those articles which are in active demand, at the local stores. A larger and more convenient storehouse is very much needed and is now being made in which a properly assorted and sufficient supply of the goods which are in daily use by the Department can be kept on hand and properly cared for.

The purchase of a two-ton motor truck early in the year has been of great service in distributing supplies and, in case of emergency, carrying materials and tools to distant points.

September 15, 1913, an auction sale of material no longer of use to the City was held at Brooklyn and Queensboro Bridges, the amounts realized being \$893.15 and \$807.50, respectively.

While the various shops of the Department come under the jurisdiction of this Division it has been found convenient to have the work in them under the immediate care of the Division Engineers for the prompt execution of local work, with the exception of the shops at Brooklyn Bridge, which are considered the central shops of the Department, where in addition to taking care of all the shop work of Brooklyn and Manhattan Bridges and of the Division of Brooklyn, Queens and Richmond, all heavy work for which the Division Shops are not equipped, is done. These shops were originally intended for Brooklyn Bridge work only and were equipped with special reference to repairing the cars and locomotives used on that structure but they are now used for the general work of the Department and are well suited in location and equipment for that purpose. Power is furnished by one of two 60 horse power Babcock & Wilcox boilers and an engine also in duplicate. The shops contain

- 5 drill presses
- 8 lathes
- 2 wood turning lathes
- 2 planers for metal
- 1 planer for wood
- 1 milling machine
- 3 pipe cutting and threading machines, 2-inch, 4-inch and 6-inch
- 2 bolt cutting and threading machines, 1½-inch and 3-inch
- 1 steam hammer
- 1 power shear
- 1 power punch
- 1 metal saw
- 2 circular saws

- 1 swing saw
- 1 band saw
- 1 edging machine
- 1 mortising machine
- 1 paint mixer

—and a proper equipment of anvils, forges, bench vises, chain blocks, grinders and small tools. The tools are all of good capacity; the men are well trained and skillful and there is very little metal work except making castings, required by any Division that cannot be handled promptly and economically in these shops.

The Brooklyn and Manhattan Bridges are equipped with air pipe lines for furnishing power for structural painting and repairs and with a sufficient outfit of air drills, chipping, riveting and stone hammers. Air is compressed at a central station in the old cable plant boiler room of the Brooklyn Bridge at Prospect and Washington streets, Brooklyn. The air compressor is an Ingersoll-Rand duplex steam driven, 200 horse power, class "02" machine; the steam cylinders having a diameter of 12 inches, the air cylinders of 12¼ and 20¼ inches, stroke 18 inches, speed 180 R. P. M. It delivers 1,117 cubic feet of air per minute at a pressure of 100 pounds.

The steam for this compressor is supplied at 80 pounds pressure by one of two Babcock and Wilcox boilers. These boilers are rated at 125 H. P., each having a grate area of 52.5 square feet and heating surface of 2,078 square feet. In addition to the steam for the air compressor, steam is also furnished for heating the electrician's room, the old waiting room in the Sands street station, the two public comfort stations, the cement testing plant and the Municipal garage.

The Division of Brooklyn, Queens and Richmond has no independent shop but has for field work a portable electric compressor and a complement of the usual tools.

In the shop at Williamsburg Bridge, electricity is used for driving the machinery and also for compressing the air which is used in the field tools.

The shop tools are

- 1 drill press
- 1 foot power lathe
- 1 band saw
- 1 planer
- 1 power hack saw
- 1 paint mixer
- 1 shears

—and a good outfit of jacks, chain hoists, anvils, etc.

At the Queensboro Bridge the shops are situated under the Manhattan Approach. The machinery is electrically driven and consists of:

- 1 power combined punch and shears
- 2 power hack saws
- 1 drill press
- 1 wood saw
- 1 paint mixer
- 1 portable electric compressor and usual tools for work on structure.

The shop connected with the Division of Harlem River, Manhattan and Bronx Bridges is situated under the Manhattan Approach of the Madison Avenue Bridge and is equipped with

- 1 bolt cutter and threader
- 3 drill presses
- 3 power hack saws
- 1 portable key seater
- 1 pipe cutter and threader
- 1 hand punch

- 1 hand shears
- 1 hand combined punch and shears
- 1 wood saw
- 1 shaper
- 2 lathes
- 1 portable gasoline driven air compressor with appropriate tools
- 1 paint mixer
- 1 oxy-acetylene cutter and welder and a good supply of jacks, chain hoists, anvils, forges and small tools.

The shop was formerly run by one 7½ H. P. oil engine but its removal to new quarters and the addition of new tools has made a change of power advisable and it is now being equipped with electric motors.

Tools for the various shops have been selected with reference to the work required in the Divisions which they served and as the character of work has changed or increased, the plant has been modified accordingly.

RENTALS, & c.

RENTALS, ETC.

APPROXIMATE RENTALS

Real estate	\$81,322 00
Wires, cables, etc.....	16,180 00
Terminal facilities	10,000 00

Rent for terminal at Third Avenue Bridge collected by Department of Finance—City revenue, although the agreement provides that same shall be collected by Commissioner of Bridges.

Rent for push cart and fish markets collected by Department of Finance—City revenue.

RENTAL AND PRIVILEGES—DEPARTMENT OF BRIDGES

Premises. Bridge Arch.	Brooklyn Bridge Manhattan.	Rental Per Annum	Payable.	Term of Lease.	Expires.
No. 1.....	Myer Paltrowitz.....	\$2,100	Monthly.....	1 Year.....	Dec. 31, 1914
No. 2.....	Newman London.....	1,800	Monthly.....	1 Year.....	Mch. 31, 1914
Nos. 3, 4, 5, and 6.....	Bklyn Bridge Freezing & Cold Storage Co..	8,000	Quarterly.....	10 years with priv- ilege.....	May 1, 1925
Nos. 7 & 8.....	Bklyn Bridge Freezing & Cold Storage Co..	3,000	Quarterly.....	1 Year.....	May 1, 1914
Nos. 9, 10 & 11.....	Bklyn Bridge Freezing & Cold Storage Co..	4,500	Monthly.....	10 Years with priv- ilege.....	Dec. 1, 1931
Nos. 12, 13, 14 & 15.....	The Star Co.....	6,000	Monthly.....	5 Years with priv- ilege.....	May 1, 1915
No. 16.....	Birns Express.....	1,200	Monthly.....	Tenant at will.....	
No. 17.....	A. Hirsch & Co.....	1,200	Monthly.....	Tenant at will.....	
Water St. arches, includ- ing land on Dover and					
Water Sts.....	Egleston Bros. & Co..	3,000	Monthly.....	1 Year.....	Nov. 30, 1914
348 to 352 Pearl St.....	Chas. G. Smith.....	3,000	Monthly.....	5 Years with priv- ilege.....	May 1, 1915
262-264 Front St.....	Max Hanshaft.....	900	Monthly.....	1 Year.....	Dec 31, 1914
266-270 Front St. & 291- 293 Water St.....	Baker & Williams.....	2,825	Monthly.....	1 Year.....	Dec. 31, 1914
272-274 Front St.....	D. Kahnweiler's Sons..	1,600	Monthly.....	1 Year.....	Apl. 30, 1914
285-287 Water St.....	Bayer Bros.....	1,000	Monthly.....	1 Year.....	Mch. 1, 1914
297 Water St.....	J. Schnair.....	800	Monthly.....	1 Year.....	Mch. 31, 1914
275-277 Front St.....	W. F. Haslam.....	1,350	Monthly.....	1 Year.....	Dec. 31, 1914
Gore adjoining 276 Front St.....	Jas. F. Cosgrove.....	15	Annually.....	Oral agreement.....	
276-278 Front St.....	M. O'Connor & Sons..	810	Monthly.....	1 Year.....	Dec. 31, 1914
279 Front St.....	Carl Edelstein.....	818	Monthly.....	1 Year.....	Dec. 31, 1914
281 Front St.....	M. Stramiello.....	720	Monthly.....	1 Year.....	De. 31, 1914
Gore adjoining 166 South St.....	Egleston Bros. & Co..	600	Quarterly.....	Oral agreement.....	
167 South St.....	Marine Metal & Sup- ply Co.....	820	Monthly.....	1 Year.....	Dec. 31, 1914
168 South St.....	Israel Etkin.....	920	Monthly.....	1 Year.....	Dec. 31, 1914
169 South St.....	Est. of Jno. Harrison..	970	Monthly.....	1 Year.....	Dec. 31, 1914
170 South St.....	Est. of Jno. Harrison..	970	Monthly.....	1 Year.....	Dec. 31, 1914
171 & 172 South St.....	Egleston Bros. & Co..	1,000	Monthly.....	1 Year.....	Dec. 31, 1914
Vaults A & B under South Roadway.....	The Press Pub. Co..	2,000	Monthly.....	10 Years with priv- ilege.....	May 1, 1931
Space under S. Roadway..	The "World".....	180	Monthly.....	Oral agreement.....	
Pier 29, E. R.....	Clyde Steamship Co..	15,000	Quarterly.....	10 years with priv- ilege.....	May 1, 1915

BROOKLYN BRIDGE

		Rental Per Annum	Payable	Term of Lease	Expires
Brooklyn Tower Yard and Wharf.	Brooklyn Ash Removal Co. Inc..	2,800	Monthly.	Monthly	
21 and 23 Water St., including Vacant Land and Bulkhead	Held for new shops and stores				
Northwest corner Front & Dock Sts., vacant lot	Jos. H. Colyer.	430	Monthly	Tenant at will.	
Arch "C," York St.	L. Pfeiffer	250	Quarterly.	Tenant at will	
Arch "G," Main St.	Leon M. Adler	200	Monthly	Tenant at will	
Arch "H," Main St.	Leon M. Adler	144	Monthly.	Tenant at will	
North east cor. Front & Dock Sts., vacant lot	Rob't Gair.	100	Quarterly.	10 Years with privilege	Sep. 1, 1925
Prospect St. Arches	Patrick Dwyer	400	Monthly.	Tenant at will	
Station Connection Plaza	Kings Co. El. R.R. Co.	400	Quarterly.		
Washington St. Siding bet. High & Concord Sts.	Nassau Elec. R.R. Co.	1,000	Quarterly.		
B'klyn Tower Yard & Wharf.	Lease expired Dec. 31st, 1913. Lessee—B'klyn Development Co.	2,800			
21 and 23 Water St. etc	These premises were to be occupied by shops and stores. Ryan-Parker Construction Co., former lessees during construction of Manhattan Bridge, are indebted to this Department for rent from Feb. 1st, 1909, to May 1st, 1911 2 years and 3 months, at \$5,450.00 per annum, amounting to \$12,262.50 This claim was sent to the Law Department for collection, and a judgment was obtained for full amount with interest and costs. Ryan-Parker Construction Co. have filed a bond for same with the Department of Finance as per letter from Law Department, dated October 9th, 1913.				

TELEGRAPH AND TELEPHONE WIRES AND CABLES

B'klyn Heights R. R. Co.	2 wires at \$30.00 per annum each
B'klyn Union El. R. R. Co.	8 wires at 30.00 per annum each
Commercial Cable Co.	24 wires at 30.00 per annum each
Stock Quotation Tel. Co.	40 wires at 30.00 per annum each
Western Union Tel. Co.	55 wires at 30.00 per annum each
Postal Telegraph Co.	14 wires at 30.00 per annum each
Gold & Stock Telegraph Co.	26 wires at 30.00 per annum each
New York Edison Co.	3 electric cables at \$1,000 per annum each
Pneumatic Tubes (Postal) New York Mail & Newspaper Transportation Co.	Rent 7% on \$14,300, or \$1,001.00 per minimum per annum.
In litigation (claim amount of rent due). The Law Department has entered judgment, but case is on appeal.	

MISCELLANEOUS PRIVILEGES

Postal Telegraph Co.	Rent of cable in box girder, N. William and Rose Sts., Manhattan	\$5.00 per annum.
New York Telephone Co.	Rent of lead encased cable on fence property, Washington St., bet. Tillary and Concord Sts., Brooklyn	1.00 per annum.
New York Telephone Co.	Rent of cable in block bounded by York, Main and Fulton Sts., Brooklyn	1.00 per annum.
New York Telephone Co.	Rent of iron pipe under sidewalk 348-352 Pearl St., Manhattan	1.00 per annum.
United District Messenger Co.	Attachment of circuit wire between N. William and Rose Streets	1.00 per annum.

WILLIAMSBURG BRIDGE.

	Rental Per Annum	Payable.	Term of Lease.	Expires.
Terminal Facilities, Electrical Equipment, Loops, etc.....	Bridge Operating Co..	\$10,000	Quarterly....	R.R. agreement..
Part of Brooklyn Tower Wharf & Yard.....				
Property under Manhattan Approach bet. Cannon, Lewis & Goerck Sts.....	Bradley Contracting Co.....	2,000	Quarterly....	5 Years..... July 1, 1914
Property under Manhattan Approach together with pier, wharf or bulk head, land and water rights and privileges....	Bradley Contracting Co.....	2,000	Quarterly....	5 Years..... May 1, 1916
Property under Manhattan Approach, bet. Columbia & Cannon Sts..	The Underpinning & Foundation Co....	1,200	Monthly....	1 Year..... Apl. 1, 1914
Lease expired Dec. 31, 1913. Lessee—Borough Development Co. Rent—\$500 per annum.				

MISCELLANEOUS RENTS AND PRIVILEGES

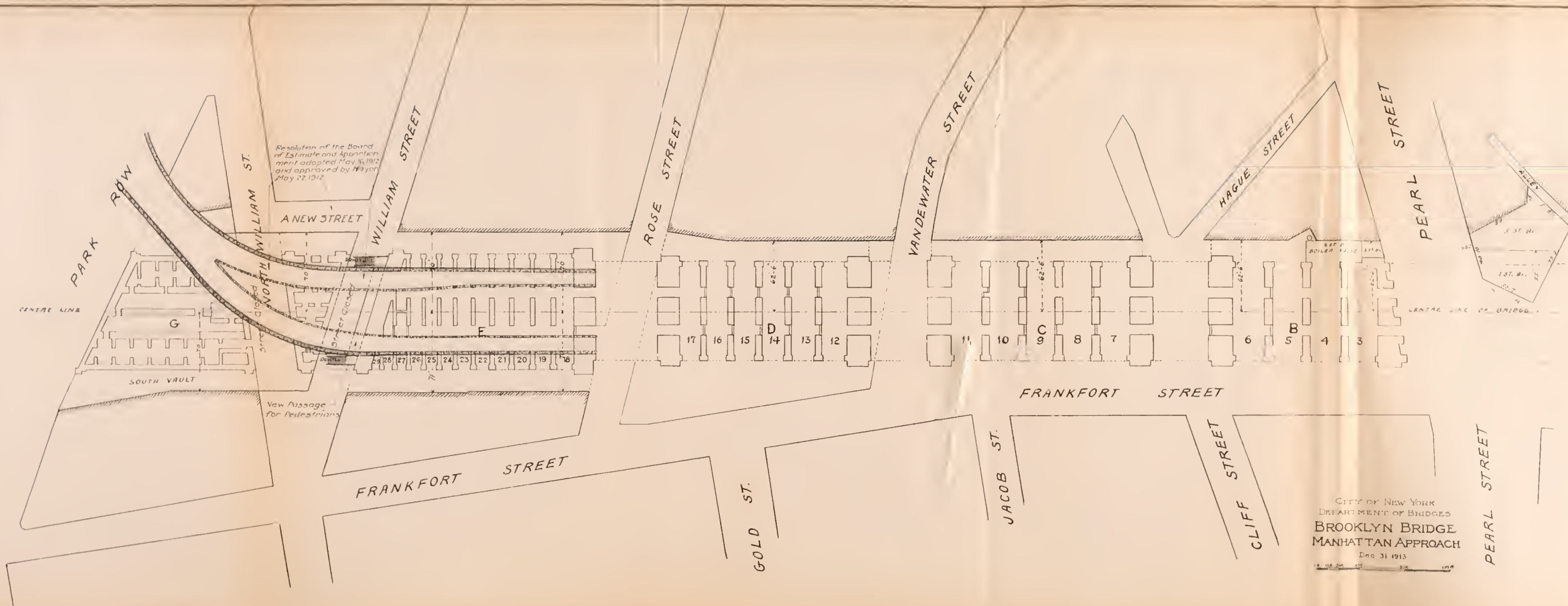
Permit for placing 12-inch wrought-iron gas main across Spuyten Duyvil Creek under the Highway Bridge at Broadway	Consolidated Gas Co. of N. Y.....	200	Quarterly....	Optional with Commissioner.....
Property under the Southeast Approach to the 3d Ave. Bridge.....	Harlem & Morrisania Trans. Line.....	2,100	Monthly....	1 Year..... May 1, 1914
Property under the Manhattan Appr. of Univ. Hts. Bridge over Harlem River with the privilege of using the wharf or bulkhead.....	Handy Bros.....	1,300	Monthly....	
Property underneath the Bronx Approach to 3d Ave. Bridge, together with wharf or bulkhead privileges on same, to be used as an access to the property owned by J. L. Mott, immediately to the north.....	Jordan L. Mott.....	400	Quarterly....	1 Year..... Dec. 31, 1914
Permit to place two 3½-inch wrought-iron pipe conduits on the Queensboro Bridge from the boundary line between boroughs of Manhattan and Queens, to a point above the east side of the westerly Blackwell's Island Pier.....	The N.Y. Edison Co..	500	Annually....	Optional with Commissioner.
Permit to place 3½-inch wrought-iron pipe conduit on the Queensboro Bridge bet. boroughs of Manhattan and Queens, to a point above a supporting column on the Queens Approach at west side of Hamilton Ave.; then down said column to a subway manhole located at its base.....	N.Y. & Queens Electric Light & Power Co.....	500	Annually....	Optional with Commissioner.

		Rental Per Annum	Payable.	Term of Lease	Expires.
Permission for placing 12 4-inch iron pipes underneath the masonry bulkhead on either side of Newtown Creek at Vernon Ave. Bridge, for the purpose of establishing a submarine cable.	N.Y. Telephone Co	200	Quarterly...	Optional with Commissioner.	
Permission for establishing submarine and cable crossing at the new Flushing Creek Bridge.	N.Y. Telephone Co	200	Quarterly...	Optional with Commissioner.	
Permission to attach and maintain a twisted pair of telephone wires to the under side of Willis Ave. Bridge over Harlem River.	N.Y. Telephone Co.	5	Annually	Optional with Commissioner.	
Permission to attach and maintain a lead-encased telephone cable to the under-side of the Bronx Approach to the Willis Ave. Bridge.	N.Y. Telephone Co	25	Annually...	Optional with Commissioner.	
Permission to cross Westchester Ave. Bridge over the Bronx River.	Union Ry. Co. of New York City	1,000	Quarterly...	Optional with Commissioner.	

All moneys received from Brooklyn Bridge and Williamsburg Bridge are deposited for the City Chamberlain in the People's Trust Co., Brooklyn.

All moneys received from Miscellaneous Rents, Permits, etc., are deposited with the City Chamberlain to the credit of the General Fund.

All moneys received from the Municipal Garage are deposited with the City Chamberlain to the credit of the Special Revenue Bond Fund.



PEARL STREET

CHERRY STREET

DOVER STREET

WATER STREET

ROOSEVELT STREET

FRONT STREET

SOUTH STREET

EAST RIVER

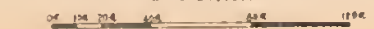
NEW YORK ANCHORAGE

NEW YORK TOWER

PIER 28

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BROOKLYN BRIDGE
MANHATTAN APPROACH

Dec 31, 1913



PEARL STREET

CHERRY STREET

DOVER STREET

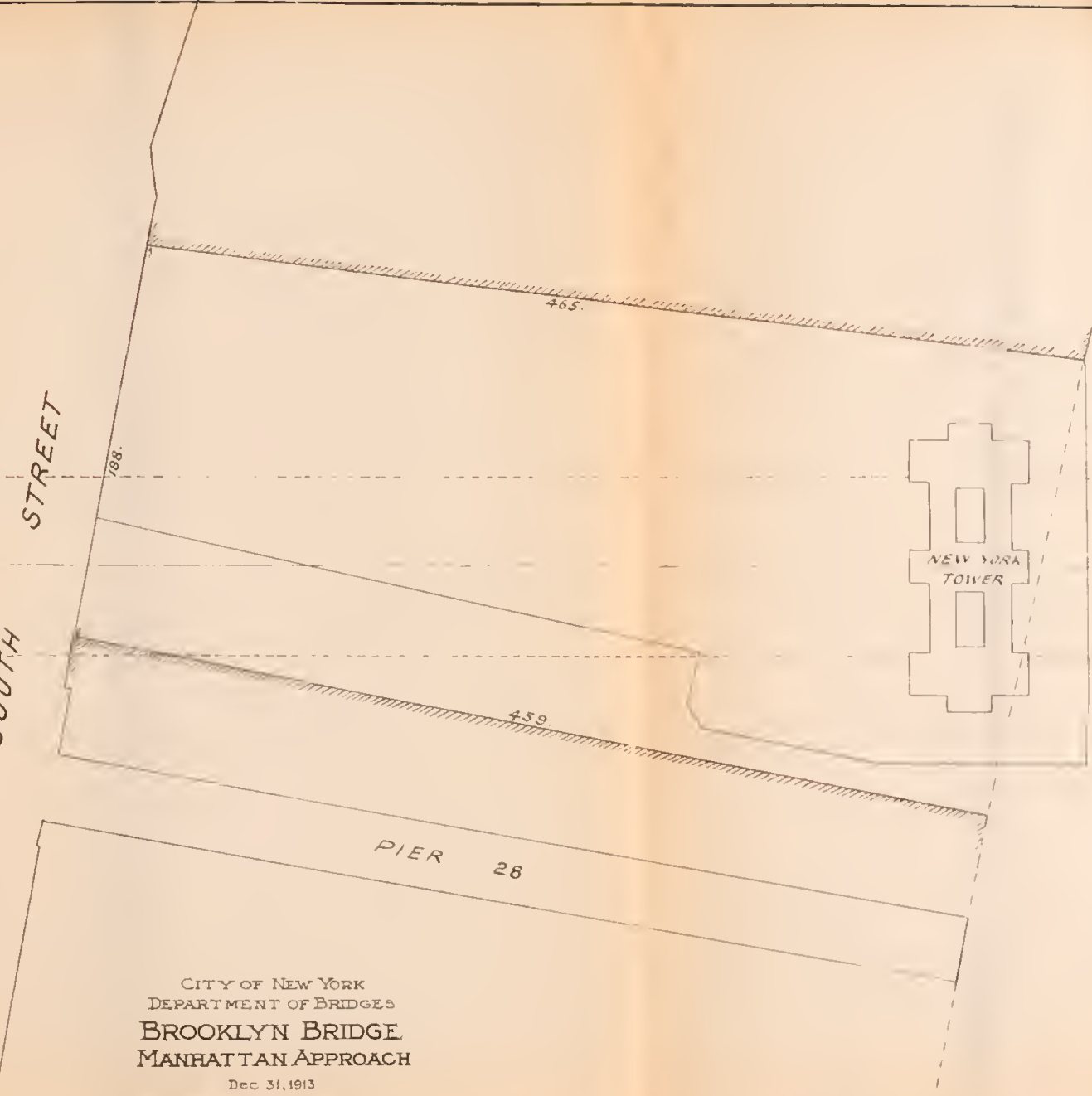
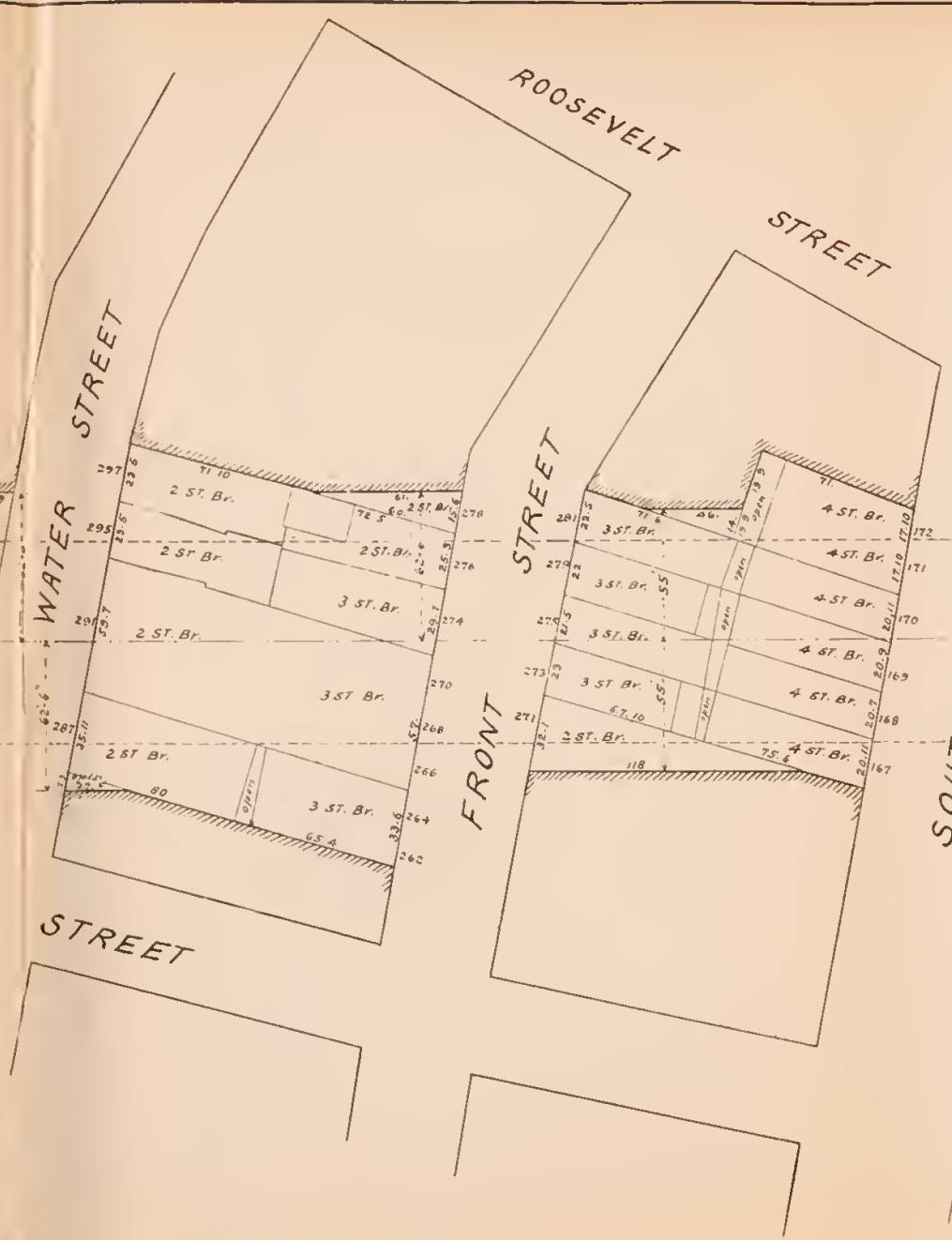
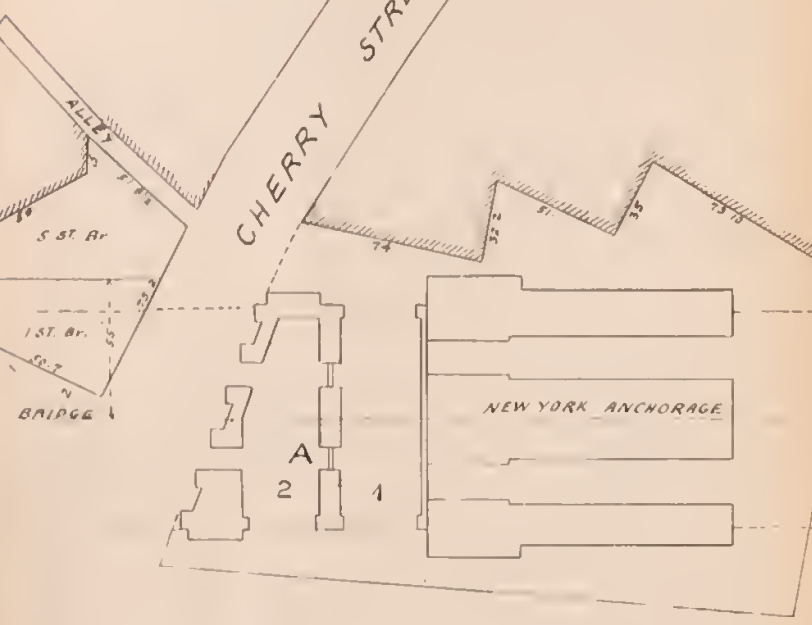
WATER STREET

FRONT STREET

ROOSEVELT STREET

SOUTH STREET

EAST RIVER



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BROOKLYN BRIDGE
MANHATTAN APPROACH
Dec 31, 1913
0 100 200 300 400 500 600 700 800 900 1000

EAST RIVER

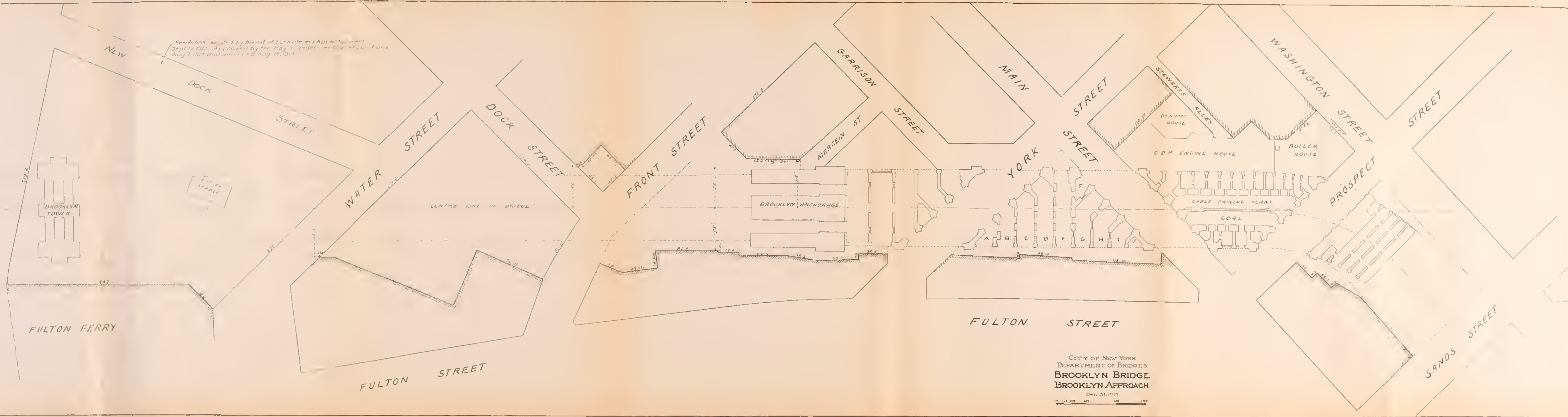
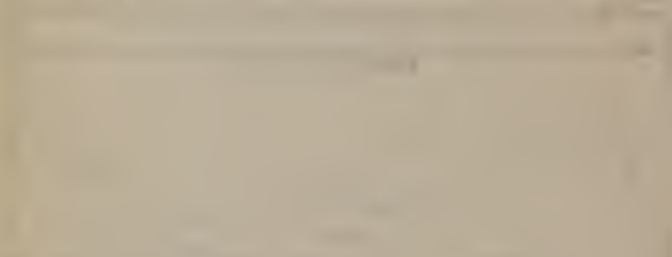




PLATE 1. THE TEMPLE OF APOLLO AT DELPHI.



THE TEMPLE OF APOLLO AT DELPHI.



THE TEMPLE OF APOLLO AT DELPHI.

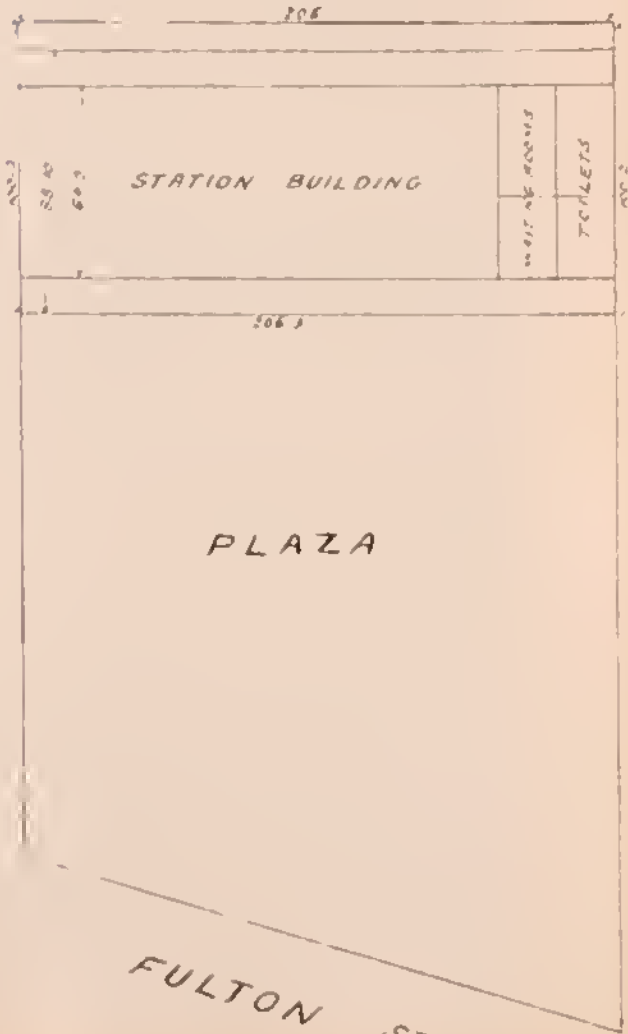


THE TEMPLE OF APOLLO AT DELPHI.

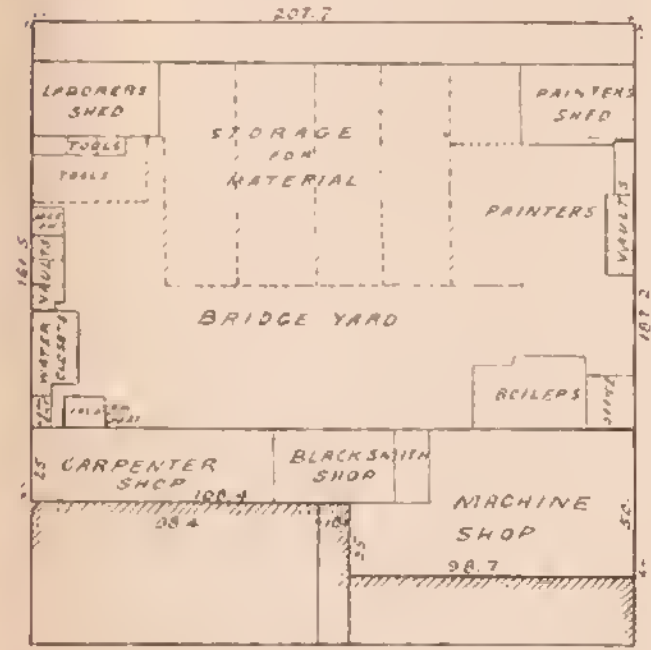
3 ST. BR.
BRIDGE OFFICE

WASHINGTON STREET

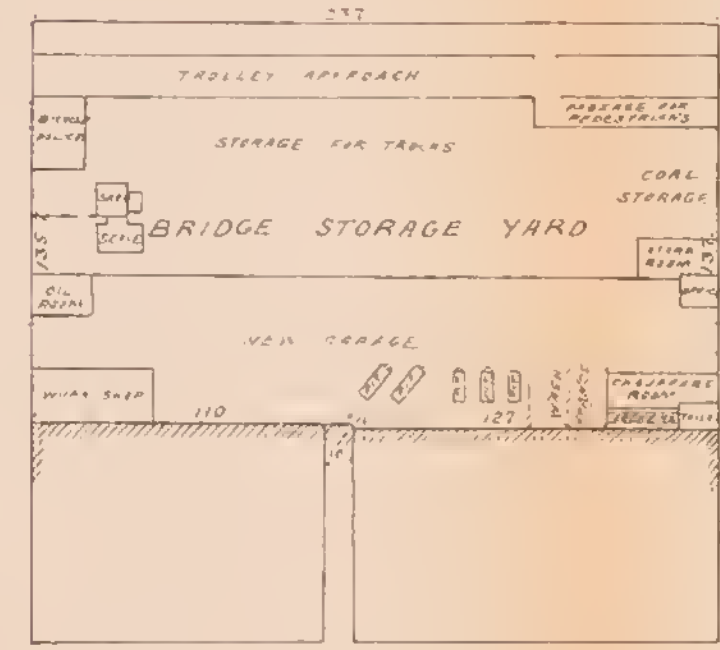
SANDS STREET



HIGH STREET



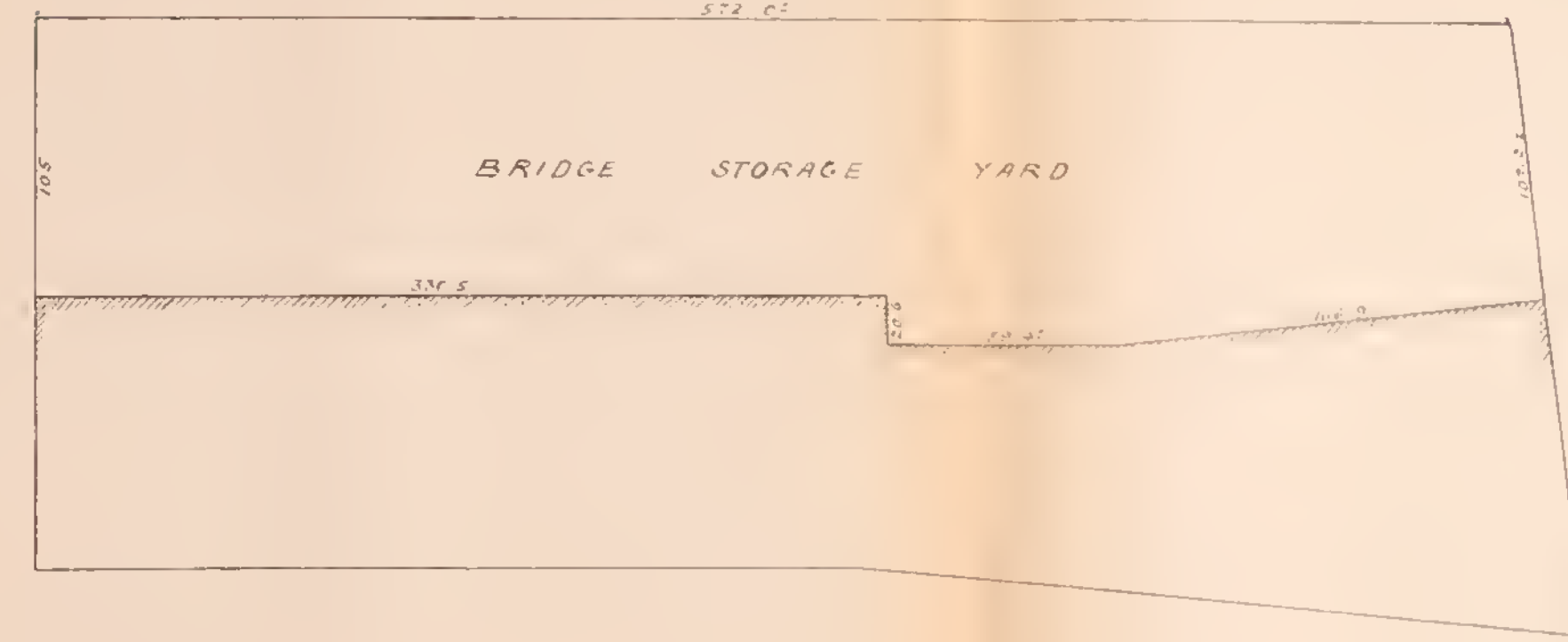
NASSAU STREET



LIBERTY STREET

WASHINGTON STREET

CONCORD STREET



TILLARY STREET

FULTON STREET

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
BROOKLYN BRIDGE
BROOKLYN APPROACH
Dec 31 1913

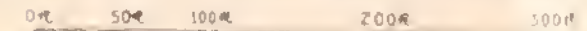
FULTON STREET



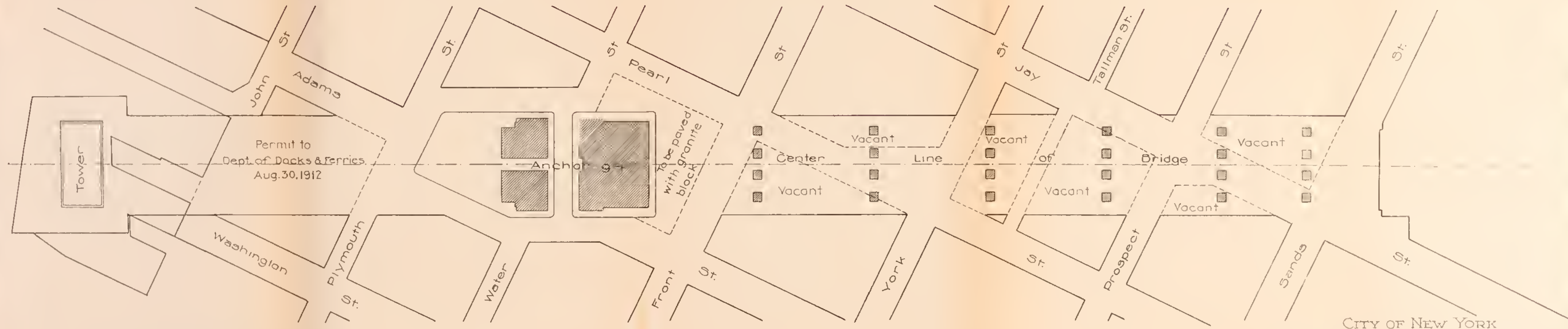
Set aside for Public Markets by Ordinance of the Board of Aldermen, adopted May 6, 1913, effective May 20, 1913 without the approval of the Mayor.



CITY OF NEW YORK
DEPARTMENT OF BRIDGES
MANHATTAN BRIDGE
MANHATTAN APPROACH







CITY OF NEW YORK
DEPARTMENT OF BRIDGES
MANHATTAN BRIDGE
BROOKLYN APPROACH



1913

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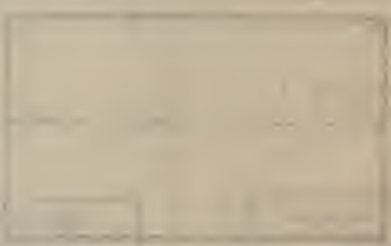
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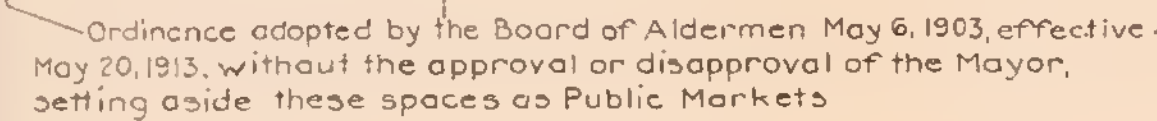
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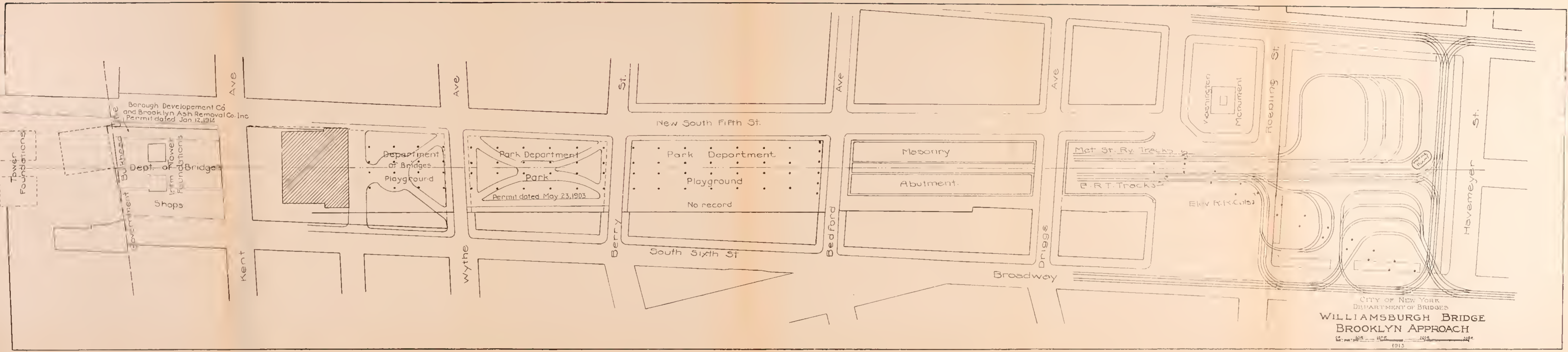
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0元	50元	100元	200元	300元
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Borough Development Co
and Brooklyn Ash Removal Co. Inc
Permit dated Jan 12, 1914

Tower
Foundations

Dept. of Bridges
Shops

Department
of Bridges
Playground

Park Department
Park
Permit dated May 23, 1903

Park Department
Playground
No record

Masonry
Abutment

Met St. Ry. Tracks
B.R.T. Tracks

Elev R.R. Cuts

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
WILLIAMSBURGH BRIDGE
BROOKLYN APPROACH

Scale: 1" = 100' 1913



CITY OF NEW YORK
 DEPARTMENT OF PUBLIC WORKS
 QUEENSBORO BRIDGE
 MANHATTAN APPROACH

100' 0" 50' 0" 25' 0" 12' 6" 6' 3" 3' 1 1/2"

1112

2nd Ave

60th

Dept. of Bridges

Shops

Food Market

Permit dated Feb. 15, 1912

59th

Ave.

1st St.

St.

Flower Market

Playground

Dept. of Parks

By Ordinance adopted by the Board of Aldermen March 7, 1911 effective Mar. 21, 1911 without the approval or disapproval of the Mayor

Recommended in a Resolution adopted by the Board of Aldermen Jan. 19, 1909 and approved by the Mayor February 2, 1909

St.

A

Ave.

Pier

Anchor

U.S. Gov. Bulkhead Line

U.S. Gov. Pierhead Line

CITY OF NEW YORK
DEPARTMENT OF BRIDGES
QUEENSBORO BRIDGE
MANHATTAN APPROACH



1913

FINANCIAL STATEMENTS, 1913

FINANCIAL STATEMENTS, 1913

EXPENDITURES DURING 1913

The resources of the Bridge Department come from three sources:

	Expended in 1913.
1. Tax Levy (budget).....	\$1,330,093 72
2. Rentals, etc.	29,590 00
3. Corporate Stock	4,318,872 71
	\$5,678,556 43

The expenditures under headings 1 and 2 are given in detail herewith.

The expenditures under heading 3 are for new work, permanent alterations, extensions, etc., not here reported in detail.

FINANCIAL STATEMENT, 1913

BUDGET—GENERAL APPROPRIATIONS FOR EXPENSES OF THE DEPARTMENT OF BRIDGES.

APPROPRIATIONS, 1912.

Resources.

January 1, 1913, Balance unexpended.....	\$88,330 77	
Refund to Pay Roll charges.....	29 03	
Voucher withdrawn from Department of Finance.....	301 25	
Transferred from "General Fund for Reduction of Taxation"	50 16	
	\$88,711 21	

Expenditures.

Vouchers certified to Comptroller for payment, 1st Quarter, 1913	\$34,036 83	
Vouchers certified to Comptroller for payment, 2d Quarter, 1913	10,879 02	
Vouchers certified to Comptroller for payment, 3d Quarter, 1913	2,713 83	
Vouchers certified to Comptroller for payment, 4th Quarter, 1913	50 16	
	\$47,679 84	
Balance transferred to "General Fund for Reduction of Taxation"	\$41,031 37	
	88,711 21	

APPROPRIATIONS, 1913.

Resources.

January 1, 1913. Appropriations for 1913.....	\$922,255 25	
Refund of Pay Roll charges.....	30 99	
	922,286 24	

Expenditures.

Vouchers certified to Comptroller for payment, 1st Quarter..	\$207,688 78	
Vouchers certified to Comptroller for payment, 2d Quarter..	217,090 90	
Vouchers certified to Comptroller for payment, 3d Quarter..	218,823 43	
Vouchers certified to Comptroller for payment, 4th Quarter..	213,430 35	
	\$857,033 46	
Transferred to Department of Education.....	5,885 25	
December 31, 1913—Balance unexpended.....	59,367 53	
		922,286 24
Note—Unexpended balance December 31, 1913.....	\$59,367 53	
Estimated contingent liabilities on contracts...	\$838 70	
Estimated contingent liabilities on open market orders	15,831 64	
Estimated contingent liabilities on Pay Rolls....	5,299 83	
		21,970 17
Unencumbered balance December 31, 1913.....		\$37,397 36

DEPARTMENT OF BRIDGES
SUMMARY OF EXPENSES FOR YEAR ENDED DECEMBER 31, 1913
(A) On Basis of Total Cost per Bridge
(Does Not Include Corporate Stock)

Name and Type of Bridges.	Statistics.		Direct Bridge Expense.				Distribution of General Expenses.			Total for Year.	Division Total for Year.
	Length of Bridges (feet).	Length of Approaches (feet).	Width of Bridge (feet).	General and Division Administration.	Operation.	Maintenance.	Comfort Stations.	Shop.	Store-house.		
General											
General Administration.....	.....	.....	.....	94,512 80	.....	.....	.....	.....	.....	94,512 80	94,512 80
Automobile Service.....	.....	.....	.....	7,896 39	.....	.....	.....	.....	.....	7,896 39	7,896 39
East River Bridges and Division of Shops and Stores.											
New York and Brooklyn (Suspension).....	.....	.....	.....	7,621 49	.....	.....	.....	.....	.....	7,621 49	.....
Williamsburg (Suspension).....	3,455½	2,560½	86	21,948 66	80,689 02	177,685 96	12,590 25	31,902 75	2,994 44	334,727 94	334,727 94
Manhattan (Suspension).....	2,793	4,515	118	20,335 71	63,397 68	133,771 75	8,076 47	6,446 59	6,656 88	238,685 08	238,685 08
Queensboro (Cantilever).....	2,920	3,935	120	6,199 11	31,234 97	22,773 30	2,425 36	.....	.....	62,632 74	62,632 74
	3,724½	3,724½	86	11,999 87	38,841 35	34,510 42	.....	958 49	3,123 85	89,433 98	733,101 23
Harlem River, Manhattan, and Bronx Bridges.											
135th Street (Bascule).....	56	.....	73½	16,103 52	2,471 03	711 70	.....	5,152 36	6,776 82	32,262 38	32,262 38
Westchester Avenue (Retractable).....	114	.....	60	.....	4,556 48	424 61	.....	.....	.....	3,182 73	3,182 73
Unionport (Swing).....	188	51	22	.....	3,831 62	1,636 59	.....	.....	.....	4,981 09	4,981 09
Pelham (Bascule).....	797	700	52	.....	7,496 13	3,468 52	.....	.....	.....	5,468 21	5,468 21
City Island (Swing).....	1,768	1,600	50	.....	3,815 26	13,265 77	.....	.....	.....	7,964 65	7,964 65
Eastchester (Swing).....	2,403	338	18½	.....	3,843 44	3,236 81	.....	.....	.....	17,081 03	17,081 03
Willis Avenue (Swing).....	2,507	2,197	70	.....	30,047 35	17,400 87	.....	.....	.....	7,100 25	7,100 25
3rd Avenue (Swing).....	2,251½	1,949	86	.....	27,174 76	16,962 54	.....	.....	.....	47,448 22	47,448 22
Madison Avenue (Swing).....	1,880	1,583	82	.....	19,618 47	202 17	.....	.....	.....	44,137 30	44,137 30
145th Street (Swing).....	1,603	1,293	84	.....	21,256 60	5,801 29	.....	.....	.....	19,820 64	19,820 64
Macomb's Dam (Swing).....	2,540	2,126½	67¼	.....	23,285 92	2,238 18	.....	.....	.....	27,057 89	27,057 89
New York and Putnam (Swing).....	954	654	6	.....	3,573 97	49 63	.....	.....	.....	23,524 10	23,524 10
Washington (Steel Arches).....	2,399	1,889	86	.....	4,060 14	1,447 22	.....	.....	.....	3,623 60	3,623 60
University Heights (Swing).....	1,081½	820	51	.....	14,021 91	978 22	.....	.....	.....	5,507 36	5,507 36
Ship Canal (Swing).....	546	276	54	.....	16,784 65	2,084 33	.....	.....	.....	15,000 13	15,000 13
Broadway (Fixed).....	46½	.....	100	.....	.....	.....	.....	.....	.....	18,868 98	18,868 98
Kings (Fixed).....	68	39	19	.....	.....	66 49	.....	.....	.....	66 49	66 49
Undistributed.....	.....	.....	.....	.....	7,046 04	14,072 69	.....	.....	.....	21,118 73	304,213 78

Name and Type of Bridges.	Statistics		Direct Bridge Expense.				Distribution of General Expenses			Division Total for Year.
	Length of Bridges (feet.)	Length of Approaches (feet.)	Width of Bridge (feet.)	General and Division Ad- ministration.	Operation.	Maintenance Stations.	Shop.	Store- house	Stable.		Total for Year.
Brooklyn Borough Bridges.										
Hamilton Avenue (Bascule).....	81½	.....	47½	9,814 08	7,346 89	2,612 48	.....	.....	513 48	10,327 56
9th Street (Bascule).....	100	27½	49	.....	7,358 24	710 16	.....	.....	.....	9,959 37
3rd Street (Bascule).....	100	27½	49	.....	6,724 50	4,100 30	.....	.....	.....	8,068 40
Carroll Street (Retractable).....	140	99	28	.....	5,319 47	1,231 04	.....	.....	.....	10,824 80
Union Street (Bascule).....	100	27½	49	.....	4,820 44	776 24	.....	.....	.....	6,550 51
Washington Avenue (Retractable).....	115½	65½	45	.....	7,636 92	1,083 85	.....	.....	.....	8,720 77
Harway Avenue (Bascule).....	300	247	33	.....	4,502 84	227 42	.....	.....	.....	4,730 23
3rd Avenue (Fixed).....	42	.....	70½	.....	.....	.....	.....	.....	.....	.....
Ocean Avenue (Fixed).....	2,318	.....	8	.....	.....	2,182 05	.....	.....	.....	2,182 05
Shell Road (Fixed).....	161½	.....	17	.....	.....	15 62	.....	.....	.....	15 62
Newtown Creek Bridges										
Vernon Avenue (Bascule).....	1,698½	1,500	60	.....	25,026 09	13,301 38	.....	.....	.....	38,327 47
Greenpoint Avenue (Swing).....	282	75	32	.....	8,807 04	1,436 58	.....	.....	.....	10,243 62
Meeker Avenue (Swing).....	284	84	31	.....	9,836 54	3,395 09	.....	.....	.....	13,231 63
Grand Street (Swing).....	550	320	36	.....	7,258 60	1,788 85	.....	.....	.....	9,047 45
Metropolitan Avenue (Swing).....	365	95	33	.....	7,812 06	1,694 32	.....	.....	.....	9,506 38
Metropolitan Avenue (Fixed).....	105	60	32	.....	.....	117 07	.....	.....	.....	117 07
Queens Borough Bridges										
Borden Avenue (Retractable).....	265	90	50½	.....	4,391 94	984 57	.....	.....	.....	5,373 51
Flushing Creek (Bascule).....	351	262	52	.....	7,052 00	1,131 79	.....	.....	.....	8,186 79
Strong's Causeway (Swing).....	135	44	33	.....	830 24	74 47	.....	.....	.....	924 71
Little Neck (Swing).....	157	65	18	.....	509 43	31 25	.....	.....	.....	540 68
Hunter's Point Avenue (Bascule).....	153	64	48	.....	2,571 82	400 60	.....	.....	.....	2,675 42
Richmond Borough Bridges										
Lenox Creek (Draw).....	400	30	12	.....	868 90	1,240 58	.....	.....	.....	2,109 48
Fresh Kills (Swing).....	1,926	1,836	20	.....	1,149 58	3,890 25	.....	.....	.....	5,039 83
Undistributed.										
Municipal Building.....	.....	.....	.....	.....	3,913 94	10,415 62	.....	.....	.....	14,329 56
Grand Total.....	.....	.....	.....	196,431 63	531,665 20	503,232 61	23,092 08	44,460 19	19,551 99	1,330,093 72

RECAPITULATION OF EXPENSES FOR YEAR ENDED DECEMBER 31ST, 1913

(B) On Basis of Budget Classification

(Does Not Include Corporate Stock)

	Administra- tion.	Care of Bridges.	Total for Year.
<i>Personal Service</i>	\$182,098 56	\$938,146 38	\$1,120,244 94
<i>Supplies</i>			
Forage and Veterinary.....	.....	1,550 27	1,550 27
Fuel.....	742 44	12,685 61	13,428 05
Office.....	2,173 02	88 34	2,261 36
Laundry, Cleaning and Disinfecting...	133 44	1,236 30	1,369 74
Motor Vehicle Supplies.....	910 60	.....	910 60
General Plant.....	84 39	3,639 01	3,723 40
Total.....	\$4,043 89	\$19,199 53	\$23,243 42
<i>Purchase of Equipment</i>			
Office.....	673 24	39 75	712 99
Live Stock.....	.....	.....	.....
Motor Vehicles.....	2,523 84	.....	2,523 84
Wearing Apparel.....	.....	.....	.....
General Plant.....	68 53	10,991 91	11,060 44
Total.....	\$3,265 61	\$11,031 66	\$14,297 27
<i>Materials</i>			
Building.....	.....	.....	.....
General Plant.....	1,213 80	86,588 54	87,802 34
Total.....	\$1,213 80	\$86,588 54	\$87,802 34
<i>Contract or Open Order Service</i>			
General Repairs.....	277 81	43,627 61	43,905 42
Hire of Horses and Vehicles with Drivers.....	.....	29,510 76	29,510 76
Storage of Motor Vehicles.....	502 46	.....	502 46
Shoeing and Boarding Horses.....	.....	3,960 35	3,960 35
Car Fare.....	355 39	1,197 21	1,552 60
Expressage and Deliveries.....	18 28	.....	18 28
Telephone.....	3,258 42	37 12	3,295 54
Telegraph, Cable and Messenger.....	15 07	.....	15 07
General Plant.....	365 50	281 71	647 21
Motor Vehicle Repairs.....	1,002 12	.....	1,002 12
Total.....	\$5,795 05	\$78,614 76	\$84,409 81
<i>Contingencies</i>	14 72	.....	14 72
Waste, Breakage and Leakage.....	.....	81 22	81 22
Grand Total.....	\$196,431 63	\$1,133,662 09	\$1,330,093 72

ACCOUNT CODE NOS. C-D.B-37, 37A, 38, 38B AND 38C.

MUNICIPAL BUILDING—STATEMENT TO DECEMBER 31, 1913.

Description of Work.	Amount Paid.	Estimated Cost to Complete.	Estimated Total.
Preliminary Plans and Specifications.....	\$16,372 47	.....	\$16,372 47
Architects' Fees	582,201 58	\$72,798 42	655,000 00
Incidentals and Salaries.....	80,995 28	1,307 74	82,303 02
Foundation	1,351,422 13	.....	1,351,422 13
Water and Gas Mains.....	60,241 85	12,221 08	72,462 93
Superstructure	5,742,107 88	197,220 88	5,939,328 76
Interior Finish	1,972,378 16	1,183,392 72	3,155,770 88
Painting .....	.....	55,000 00	55,000 00
Elevators	385,815 60	81,818 95	467,634 55
Window Shades	303 75	2,531 25	2,835 00
Lighting Fixtures .....	.....	46,487 60	46,487 60
Metal Railings, etc.....	.....	93,975 05	93,975 05
Furniture .....	.....	600,000 00	600,000 00
	\$10,191,838 70	\$2,346,753 69	\$12,538,592 39

ESTIMATED CHANGES FOR TEN-FOOT CAR OPERATION OVER EAST RIVER BRIDGES

DEPARTMENT OF BRIDGES, DIVISION OF DESIGN—July 17, 1913

	BROOKLYN BRIDGE	MANHATTAN BRIDGE	WILLIAMSBURG BRIDGE	QUEENSBORO BRIDGE
Can bridge be altered to allow for operation of cars 10' wide?	Yes.	Yes.	Yes.	Yes.
Minimum clearances 10' car existing structure.....	1' 10" overhead. 1' 4" sides, 8½" to clear signals 10' on approaches.	2' 4½" overhead. 3" side at anchorages. 1' 6" between cars.	None to sides.	None to sides.
Minimum clearances 10' car, Structure as altered.....	1' 10" overhead. 1' 4" sides, 8½" to clear signals. 10' on approaches.	2' 4½" overhead. 6" at anchorages only. 1' 6" between cars at anchor. ages only.	6" to sides.	6" to side. 6" to roof.
Nature of alterations for operating 10' cars.....	Platforms in stations at both ends of bridge changed. Track improvement.	On each anchorage at saddles shift tracks from 11' 6" ctrs. to 11' 0" ctrs.	Spreading cables, changing columns on Manhattan approach; moving wall and columns; altering beams and platforms.	New stringers and railings. New track. Track centers shifted. Grades changed.
Cost of alterations.....	\$65,000.	\$500.	\$125,000.	\$1,200,000. Two tracks for subway trains. Two tracks for elevated trains. 2d Ave. to Ely Ave.
Allowable maximum axle loads for existing structure.....	Carrying now 27,000 lbs. per axle. With good track and proper operation, 31,000 per axle.	31,000 lbs. per axle or loads for proposed 10' car.	31,000 lbs. per axle or loads for proposed 10' car.	Two axles at 26,000 lbs., lower deck. Four axles at 26,000 lbs., upper deck.
Allowable maximum axle loads for structure as altered.....	No alteration of track floor proposed.	No alteration of track floor proposed.	No alteration of track floor proposed.	31,000 lbs. per axle or loads for proposed 10' car.
Allowable number of 67'x10' cars per train.....	Four cars.	As required.	As required.	Six cars.
Allowable spacing of trains...	1,000 ft. ctr. to ctr. of train.	Minimum distance required for safe operation.	Minimum distance required for safe operation.	As per Report of June 1, 1910, by Dept. of Bridges.
Capacity of each track.....	60 trains per hour at 15 miles per hour.	66 trains per hour at 25 miles per hour.	66 trains per hour at 25 miles per hour.	41 trains per hour at 29 miles per hour.
Number and location of tracks to be used.....	Two tracks now used for elevated trains.	Four tracks, lower deck.	Two tracks now used for elevated trains.	Two on upper deck for elevated trains. Two inside tracks, lower deck for subway trains.
Plans and construction to be done by Bridge Dept.....	All work on bridge property.	All work on property under jurisdiction of Bridge Dept. except portion of work assumed by Public Service Commission on approval of the Comm. of Bridges.	All work on property under jurisdiction of Bridge Dept. except portion of work assumed by Public Service Commission on approval of the Comm. of Bridges.	All work on property under jurisdiction of Bridge Dept. except portion of work assumed by Public Service Commission on approval of the Comm. of Bridges.
Plans and construction to be done by Public Service Commission.....	None.	See note above.	See note above.	See note above.
Amount of Corporate Stock required by Bridge Dept. to contract for work of adapting bridges for rapid transit service for 67' x 10' cars. (Not including work to be contracted for by the P. S. Com.)	\$65,000.	None.	\$125,000.	\$1,200,000.
Length of time required.....	Six months.	Two months.	Twelve months.	Eighteen months.

DIVISION OF MAINTENANCE

AREAS IN SQUARE YARDS OF BRIDGE ROADWAYS AND SIDEWALKS, AND STREET ROADWAYS AND SIDEWALKS UNDER JURISDICTION OF DEPARTMENT OF BRIDGES FROM WHICH SNOW IS REMOVED

DIVISION OF EAST RIVER BRIDGES.					HARLEM RIVER, MANHATTAN AND BRONX BRIDGES.					BROOKLYN, QUEENS AND RICHMOND BRIDGES.						
	BRIDGE		STREET		TOTAL.	BRIDGE		STREET		TOTAL.	BRIDGE		STREET			
	Road-way.	Side-walk.	Road-way.	Side-walk.		Road-way.	Side-walk.	Road-way.	Side-walk.		Road-way.	Side-walk.	Road-way.	Side-walk.		
Brooklyn.....	23,473	9,962	.....	9,806	43,241	14,234	5,378	.....	111	19,723	7,556	3,000	450	139		
Manhattan.....	26,893	18,059	.....	13,205	48,157	15,016	4,358	.....	500	19,874	578	439	.....	1,017		
Williamsburgh.....	32,280	16,003	.....	53,974	102,257	41,659	3,490	.....	.....	14,749	672	383	.....	1,055		
Queensboro.....	45,800	33,700	10,475	18,675	108,650	17,287	3,278	.....	.....	20,565	628	622	.....	1,250		
Total.....	128,446	67,724	10,475	95,660	302,305	11,173	4,432	.....	350	16,105	Not cleaned	Not cleaned (fixed trestle).	.....	2,984		
						N. Y. & Putnam.....	350	.....	350	21,111	1,411	300	667	606		
						Washington.....	7,917	.....	.....	9,423	1,078	917	1,000	667		
						University Heights.....	7,351	2,072	.....	2,576	Not cleaned.	Not cleaned.	.....	589		
						Ship Canal.....	2,123	153	.....	459	.....	.....	.....	.....		
						Broadway.....	287	172	.....	80	.....	.....	.....	.....		
						Kingsbridge.....	58	22	.....	413	.....	611	300	.....		
						135th street.....	270	112	31	980	.....	1,000	717	53		
						Westchester avenue.....	484	256	103	606	.....	594	228	822		
						Unionport.....	517	.....	89	.....	.....	2,022	778	2,800		
						Pelham.....	8,137	3,222	.....	11,359	.....	389	172	561		
						City Island.....	6,702	2,742	.....	9,444	.....	544	250	794		
						Eastchester (old).....	*301	.....	.....	301	.....	833	300	1,133		
						Eastchester (temporary)	†	.....	.....	.....	.....	600	.....	600		
						Total.....	108,793	38,354	223	748	148,118	600	.....	1,406		
											Metropolitan avenue.....	950	456	1,406		
											Harway avenue.....	861	372	1,233		
											Fresh Kills.....	261	.....	261		
											Lemon Creek.....	117	.....	117		
											Third avenue.....	Cleaned by Dept. of St. Cleaning.	.....	.....		
											Ocean avenue.....	539	.....	539		
											Shell Road.....	Not cleaned.	.....	.....		
											Total.....	22,961	9,773	2,117	1,465	36,316

† To be cleaned only in heavy snow storms.

* Vernon avenue, Borden avenue and Flushing bridges, cleaned by Dept. of Bridges and emergency labor.

* Cleaning to be discontinued when temporary bridge is open.

† Not cleaned at present.

* South footwalk only. North footwalk not open.

